The effect of female participation in top management teams on the growth performance of small and medium-sized enterprises (SMEs)
Evidence from a panel-data analysis in Chinese-listed SMEs

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Abstract

Purpose – This paper aims to examine the relationship between the female participation in top management team (TMT) and the growth performance of small and medium-sized enterprises (SMEs) in the Chinese economic environment.

Design/methodology/approach – Adopting resource dependence theory, this paper tests the hypotheses using panel data from 469 Chinese-listed SMEs during the period of 2011 to 2013.

Findings – The results show that female participation in TMT significantly promotes the growth performance of SMEs, and there is significantly inverted U-shaped relationship between these two variables.

Originality/value – This paper finds that education level weakens the inverted U-shaped relationship between the female's participation in TMT and the growth performance of SMEs.

Keywords Small and medium-sized enterprises, Female participation in TMT,
Growth performance, Education level

Paper type Research paper

Introduction

Data from Global Entrepreneurship Monitor (GEM), which is a leading academic research project in entrepreneurship, show that the proportion of women involved in entrepreneurship increased from 4.93 in 2001 to 11 per cent in 2014 around the world. The contribution of women entrepreneurs to the economic and social development is increasing rapidly, and women entrepreneurs have become one of the main driving forces in the global economic growth. This phenomenon is particularly highlighted in China. According to the "Hurun Richest Self-Made Women in the World 2015", 49 of the 73 come from China, which

is 67.12 per cent of the total. However, the majority of female workers in developing countries enters the labor market through the sector of small and medium-sized enterprises (SMEs), and most of them are indulged in the service and other small-scale industries (Singh *et al.*, 2001). SMEs are very important for the stability of national economies and also play a key role in the development of innovation productivity and employment. However, the stability for sustainable development of the SMEs is poor and also facing financing difficulties. Therefore, to attract investors and ease the financing disadvantage, after surviving from the fierce competition in the market, the next important problem of the SMEs is to maintain sustainable and stable growth. How to construct an appropriate organizational structure, especially the top management team (TMT) for the achievement of sustainable growth of the firm, is an attractive question for the practitioners and academicians. Academic research has especially investigated the effect of female participation in TMT exerted on firm performance (see literature review further below), and they measured the firm performance by market, products/services, employment and so on. However, the stakeholders are focused on the ability to grow in the long term rather than the short-term profitability of the firm. The growth abilities are considered as fundamental factors to the SMEs in the process of strategic and adjustment choices. Thus, exploring the influence of female participation in TMT on SMEs' growth performance has strategic importance.

Literature review

Many scholars in recent years have studied the relationship between female participation in TMT and firm performance. However, the empirical evidence in the extant literature is inconclusive. Some suggest that female participation in TMT has significant positive effects on firm performance. Using the data for the 2,500 largest Danish firms observed during the period 1993-2001, Smith *et al.* (2006) found a significantly positive effect of the proportion of women in top management on firm performance as measured by gross profits to sales. Moreover, they also found that the positive effects of women in top management strongly depended on the qualifications of female top managers. Joy *et al.* (2007) analyzed the US firms during 1996-2000 and found a positive relationship between the proportion of women in top management and firm performance. Some evidence shows that there is no significant relationship in some cases. Campbell and Mínguez-Vera (2008) used the data for non-financial firms listed on the continuous market in Madrid during the period from 1996 to 2000 and found that the relationship between the percentage of women on the board and firm value was not significant. Carter *et al.* (2010) examined the sample of 641 US firms in the S&P 500 index, and they were unable to find any significant relationship between the number of women directors and Tobin's *Q*. Contrary to these findings, some scholars find that female-owned firms have lower level at firm size, survival rate and growth (Aterido and Hallward-Driemeier, 2011; Coleman, 2007; Zwan *et al.*, 2012; Bardasi *et al.*, 2011; Coleman and Robb, 2009), compared to male-owned firms. Using a sample of Kuwait small firms, Alowaihan (2004) found that female-led firms are worse than male-led firms at the level of performance. Singh *et al.* (2001) found that employment growth rates of female enterprises were significantly lower than those of male enterprises in an analysis of micro and small enterprises in Java.

In addition, there are limited amount of research discussed on the topic in China so far. Ting and Zheng (2010) used an empirical analysis to support a positive relationship between the degree of female participation and firm performance in Chinese privately owned companies. The positive relationship was further strengthened by female top executives' human capital and social capital. Using a sample of Chinese GEM companies taken from

2009 to 2010, Ping and Qihong (2012) found that female executives had a positive significant effect on technological innovation. Human capital strengthened the positive significant effect of female executives on innovation performance.

To summarize, the conclusion from the previous empirical studies is extremely ambiguous. This may be due to different samples and methods selected. First, the geographical characteristics of the SMEs play a crucial role because of the unpredictable literature i.e. on one hand in Europe and America there is a positive impact of female participation in TMT, while on other hand researchers come up with negative impact in Africa and Asia. Second, the existing studies are focused on large firms, and the studies about SMEs are very few. However, most of the female-led firms are SMEs. In addition, SMEs have been playing more important role in China's economy in terms of employment, innovation and productivity. Third, existing studies are mainly using the bivariate model which is too simple.

To conclude, the present study investigates the relationship under the context of Chinese SMEs. In this paper, we select the listed firms in the SME Board as the sample and use multivariate analysis of fixed effects to examine the relationship between female participation in TMT and growth performance. Furthermore, we examine the relationship in the context of the female top executives' human capital.

Theory and hypotheses
Resource dependence theory and female participation in top management team
Resource dependence theory (Pfeffer, 1972; Pfeffer and Salancik, 1978) suggests that organizations are open systems and need to obtain specific resources from or have interdependent relationships with the external environment for survival. So organizations need to make links with the external environment to reduce the dependency and to facilitate the attainment of resources. A primary linkage between firms and the external environment is the TMT. The board of directors has the responsibility to supply, acquire and use the resource within the organization. Along with this, they provide benefits to the organization in three different ways, i.e. advice and counsel, legitimacy and arranging the channels to communicate information and to gain superior access to the obligations or to support from important elements outside of the firm.

Hillman et al. (2000) expand these three benefits into a taxonomy of director types that provide various resources to the firm: business experts, supports specialists and community influential. Their extension of resource dependence theory suggests that different types of directors will provide different beneficial resources to the firm. As a result, a more diverse board will provide more valuable resources, which should produce better firm performance.

The resource dependence theory is applied to female participation in TMT, and many scholars agree that female executives provide a unique advantage to the firms (Hillman et al., 2007; Martínugedo and Minguezvera, 2014). According to that, the benefits of female participation in TMT can be summarized into the following two points:

First, the supply of resources and female participation in TMT will improve the organization's decision-making capacity. On the individual level, female participation in TMT can respond to the cognitive limitations of individuals effectively. The individual's cognitive ability of decision making is inadequate as revealed by the behavioral economics and organizational behavior. In the process of decision-making, the top managers use two kinds of factors, one to evaluate the limited available information about production and operation, and second to use "self Preferences" about any consideration. Female executives can provide different views and perspectives for

decision-making as well as generate more alternative and different solutions to the specific problems because they have different personality traits, such as perception, circumspection and acuteness as compared to male executives. In the side of strategy choice, women tend to have higher risk aversion and choose a stable growth rate for the firm (Sabarwal *et al.*, 2009); in decision control, women are more open and emphasize sharing and broad participation (Gardiner and Tiggemann, 1999). On the firm level, females participating in TMT bring unique resources to the firms. The essential requirement of the resource dependence theory relies on the complement of personal characteristics (background and ability of the TMT members) and the strategic resources, i.e. provided by the members jointly. By virtue of their different experiences from professional life and private life (no-working) as compared to men, women may have different human and social capital. All of these can bring various varieties of thoughts, experiences and innovative ideas to the firm (Liu and Li, 2010).

Second, the acquisition and utilization of resource, female participation in TMT can help the organization to acquire the external resource and take full advantage of the internal resource. In terms of resource acquisition, the presence of women in top management positions may improve the image of the firm, and the positive image has positive effects on customers' behavior (Smith *et al.*, 2006). Beside, women mingle and understand each other swiftly. As Hillman *et al.*, 2007; Smith *et al.*, 2006 highlighted the importance of women in the team i.e. they can recognize the female customer's demand and indirectly they can have a better understanding of the market. Thus, they can acquire more different external resources to the firm. On the other hand, female executives can help the firm to acquire the special external resource, such as information, financial capital and others because of their special social network and experience. Female executives can provide important ties to those firms having female executives because of female's special network; they can help the firm link to investors having special polices for female. As for utilization of resource, compared to men, women have deeper perspective and higher personal commitment. Female participation in TMT signals that the firm offers opportunities for career growth to both current and prospective employees. Similarly, female executives serve as role models to individuals inside the organization, as mentors for aspiring women employees (Hillman *et al.*, 2007; Lückerath-Rovers, 2013). In addition, female executives, because of higher personal commitment, better self-restraint and more intimate management style, are more likely to improve employee satisfaction and enthusiasm. Therefore, gender diversity in TMT can bring firms more valuable resources, which help firms better deal with environmental uncertainty and interdependence also perform better.

Nevertheless, there is a critical value for the proportion of female participation in TMT. Once the proportion of female participant is increased, then that critical value and the TMT move toward the homogeneity. The homogeneous team is not conducive to the internal cognitive conflicts; thereby, the lower level of discussion, exchange of information, ineffective of knowledge and skills are used in the process of decision-making. Eventually, in the case of excessive homogeneity, the team will make an extremely conservative or radical decision (Hu *et al.*, 2014). Moreover, women have lower growth expectations than male, and lower growth expectations may hinder the growth of the firm (Robb and Coleman, 2009).

In summary, we believe that gender diversity in TMT will facilitate the growth of the firm and the phenomenon of "going too far is as bad as not going far enough" in other words that too much is bad as too little. Thus, we propose the following hypothesis:

H1. Female participation in TMTs has an inverted U-shaped relationship with the SMEs' growth performance.

The moderating role of human capital
Human capital refers to the individual's knowledge, skills, physical strength and so on, which ultimately comes to the firm along with the individual. It reflects individual's cognitive ability, information processing skills, analysis capabilities and problem-solving skills. Valuable human capital collection can increase the effectiveness of the firm's management and the quality based on the level of education, i.e. the higher education level of executives in TMT, the higher the benefits to the firms (Hambrick *et al.*, 1996). Education is the fundamental way to improve individual's human capital, thus, as to human capital; the present paper refers to the education level of female top executives. Smith *et al.* (2006) found the proportion of women in top management jobs tended to have positive effects on firm performance, and this positive effect strongly depended on the qualifications of female top managers.

The level of education is consistent with an individual's cognitive ability and skills. Higher levels of education represent stronger capability of information processing and ability to discriminate among a variety of stimuli (Ting *et al.*, 2011). Therefore, the higher level of education the female executives have, the stronger cognitive ability and decision-making capability TMT gets, which facilitate business growth performance.

Furthermore, an average education level of the TMT has been found positively associated with the team's receptive attitude and cognitive ability toward innovation. Camelo-Ordaz *et al.* (2005) put forward that executives with higher education levels possess more innovative awareness and ability, and executives with lower education levels made decisions on the basis of practices; they were more willing to maintain the status quo.

Therefore, the education levels of female top executives can alleviate the "going too far is as bad as not going far enough" phenomenon to some extent. Thus, we propose the following hypothesis:

H2. The education level of female executives weakens the inverted U-shaped relationship between female participation in TMTs and SMEs' growth performance.

Data and methods
Sample data
This paper uses the sample of listed firms in Chinese SME board during the period 2011-2013. The balanced panel data were mainly collected from the China Stock Market and Accounting Research (CSMAR) database. CSMAR database is regarded as an authoritative data source of the listed firms in China, and it reports the exchange data of the Chinese securities market and relevant financial information. To ensure the validity of the sample, we treat the samples as follows:

- We exclude ST and *ST companies which have been specially treated because of abnormal production operations.
- We ignore firms with incomplete information about the education level of female executives and financial performance. To ensure the accuracy of the data and to preserve the samples as possible, the present study takes reference of Wind Info database to update and complete some related information of CSMAR database. As for some missing information, we also use the data from public information of

listed companies from Cninfo www.cninfo.com.cn to fill in. Cninfo is the earliest securities information professional website in China. After these steps, the firms are removed if their data are still incomplete.

- We drop firms listed after 2010 to ensure the integrity of accountancy period, i.e. the data requirement for penal data analysis is incomplete if the firm listed after 2010. The final sample consisted of 469 firms and 1,407 listed SMEs observations. The samples are involved in 15 industries, such as manufacturing, construction, transportation, etc., and in multiple provinces of the country including Beijing, Shanghai, Jiangsu, Zhejiang, Fujian, Guangdong, Xinjiang, etc. Consequently, the sample is representative. In this paper, all of the data were performed in Stata12.0 software.

Variable measurement
Dependent variables: growth performance (Sgro). We adopt the sales growth rate as the measure of firm growth performance. We normalize growth by using the formula:

$$Growth = \frac{X_i - X_{i-1}}{X_{i-1}} \tag{1}$$

where X = sales revenue for measuring sales growth; i = years.

Explanatory variables: female participation (Fpro). In this paper, the definition of female executives refers to the female who have ownership or actually participate in management including top executives and board of supervisors. There are two ways to measure these variables. The first is to generate a dummy variable to measure female participation in the TMT. This variable is coded 1 if the firm has at least one female executive and 0 otherwise. The second one, which is used more often, is the female participation ratio, the number of female executives divided by the total number of executives. We choose the second one, as 86.99 per cent in 469 firms have one or more female executives.

Moderator variables: The education level (Fedu). Education level is an important indicator of human capital. The education level of executives is coded in the CSMAR database:

- representing technical school graduate or below;
- junior college graduates;
- bachelor's degrees;
- master's degree; and
- doctoral degrees.

In this study we follow the same approach of CSMAR and use the average level of education among female executives as moderator.

Control variables: To guarantee the reliability of the research results, this paper controls the factors from two groups.

The group of firm characteristic variables:

- firm age, measured by the number of years that a firm is listed on the exchange (Fage);
- firm size, measured by the natural log of the total assets (Size); and
- firm ownership, dummy variable which equals 1 when the firm is state-owned, equals 0 when the firm is non-state-owned (Ows).

The group of corporate governance structure characteristic variables:

- team size, measured by the total number of executives (Tsize);
- ownership concentration, measured by shareholding percentage of the ten largest shareholders (Shr); and
- leverage: measured by the ratio of debt to assets (Lev).

Model design
Based on the above analysis, to test *H1*, we propose the following model:

$$Sgro_{it} = \alpha_0 + \beta_1 Fpro^2_{it} + \beta_2 Fpro_{it} + \beta_3 Fedu_{it} + \beta_4 Fage_{it} + \beta_5 Lev_{it} + \beta_6 Shr_{it}$$
$$+ \beta_7 Size_{it} + \beta_8 Tsize_{it} + \sum Ind + \sum Reg + \sum Owner + \varepsilon \qquad (2)$$

To test *H2*, we introduce the cross-product of female participation in TMT variable and female human capital variable and the cross-product of the square term of female participation in TMT variable and female human capital variable into the model:

$$Sgro_{it} = \alpha_0 + \beta_1 Fpro^2_{it} + \beta_2 Fpro_{it} + \beta_3 Fedu_{it} + \beta_4 Fage_{it} + \beta_5 Lev_{it} + \beta_6 Shr_{it}$$
$$+ \beta_7 Size_{it} + \beta_8 Tsize_{it} + \beta_9 Fpro_{it} \times Fedu_{it} + \beta_{10} Fpro^2_{it} \times Fedu_{it} + \sum Ind$$
$$+ \sum Reg + \sum Owner + \varepsilon \qquad (3)$$

where t represents the year, refers to the year of 2011, 2012, 2013; i represents firms; $Fpro^2$ represents the square term of $Fpro$, to eliminate collinearity, the variables of $Fpro$ are mean-centered before squared. Similarly, the variables of $Fpro$, $Fpro^2$ and $Fedu$ are mean-centered prior to the formation of interaction terms. Government support is different in different industries; the degree of market competition is different in different regions. The policy and market factors will affect the prospects for the development of firms. We need to eliminate the impact caused by industries and regions; thus, we introduce dummy variables of industries (Ind) and Regions (Reg).

Results
Descriptive analysis
Table I provides descriptive statistics for our sample. As we can see, there are 1,047 observations in total. The mean and the standard deviation of sale growth rate are 0.189 and 0.43, respectively. However, the variation in the sample is significant with the minimum sale growth rate 0.14 and the maximum 4.54. Of 469 firms, 86.99 per cent (408 firms) have one or more female top manager on average during 2011-2013. The average female participation ratio only is 0.174 and the maximum is 0.5, which indicates that half of top managers are female in some individual firms. In addition, the mean of education level of female top manager is 2.894, which means that the average education level of female top manager is junior college graduate or bachelor's degree.

As shown in the Table I, the mean of firm size of the sample firms is 12.293, and the average number of top managers is approximately 18. The mean and the standard deviation of firm age are 4.336 and 2.051, respectively.

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Table I.
Descriptive statistics

Variables	Variable code	Observations	Mean	SD	Minimum	Maximum
Sales growth	Sgro	1,407	0.189	0.430	−0.66	10.77
Female participation	Fpro	1,407	0.174	0.103	0	0.5
Education level	Fedu	1,407	2.894	0.990	0	6
Firm age	Fage	1,407	4.336	2.051	1.003	9.523
Firm size	Size	1,407	12.293	0.862	9.384	17.661
Team size	Tsize	1,407	18.124	4.414	10	37
Leverage	Lev	1,407	0.368	0.1952	0.008	0.945
Ownership concentration	Shr	1,407	62.915	13.099	21.371	94.459

Multiple regression analysis
The main types of panel data model are random effects model, fixed effects model and mixed effects models. For our data, the Hausman test results suggest that the fixed effects are superior to random effects model; thus, we choose to use the fixed effects model for regression analysis. There may be heteroskedasticity between individuals due to large N small T panel data. After testing three models, we find that they do suffer from heteroskedasticity. To deal with heteroskedasticity problems, nonparametric covariance matrix estimation is used. Table II reports the regression result.

The regression results of three models suggest that F values are significant at the 0.001 level, indicating the regression analysis is meaningful. Model 1 tests the effect of control variables. All the control variables are found to be negatively associated with firm growth performance except firm age, which has a positive significant relationship with firm growth performance. The coefficient of firm size is negative and significant. As SMEs have limited management level and often lack various resources, the expansion of firm size may bring about diseconomies of scale and lead to decrease in management efficiency. The coefficient of team size is also negative and significant, and this negative impact on the growth performance may be explained by poor internal communication and inefficient management because of over size of TMT. In addition, leverage is found to be negatively and significantly related to growth performance.

Model 2 examines the relationship between the explanatory variable, female participation ratio and the dependent variable, sale growth rate. Female participation ratio has a significant positive linear relationship with sale growth rate (coefficient is 0.335, $p < 0.001$). Meanwhile, the square term of female participation ratio is negatively and significantly related to sale growth rate (coefficient is 0.652, $p < 0.05$). This supports *H1*, which suggests that female participation in TMT has an inverted U-shaped relationship with the growth performance.

Model 3 examines the moderating effect of female top managers' education level. The interaction term of the female participation ratio multiplied by education level has the coefficient of 0.224 ($p < 0.01$) and is significantly and positively linked to growth performance. In addition, the interaction term of the square term of female participation ratio multiplied by education level has the coefficient of 0.652 ($p < 0.05$) and is significantly and positively linked to growth performance. This suggests that female top managers' education level has moderating effect on the inverted U-shaped relationship between female participation in TMTs and SMEs' growth performance, respectively.

Variables	Model 1	Model 2	Model 3
Explanatory variables			
Fpro		0.335*** (31.46)	0.376*** (11.35)
$Fpro^2$		−1.575** (−3.20)	−1.967** (−3.10)
Control variables			
Fage	0.049*** (5.66)	0.046*** (4.95)	0.047*** (5.20)
Lev	−0.213 (−1.49)	−0.225 (−1.61)	−0.226* (−1.62)
Shr	−0.001 (−0.33)	−0.002 (−0.51)	−0.002 (−0.43)
Size	−0.731*** (−3.55)	−0.724*** (−3.60)	−0.732*** (−3.56)
Esize	−0.002 (−1.02)	−0.001 (−0.44)	−0.0004 (−0.23)
Moderator variables			
Fedu		−0.024*** (−5.26)	−0.009* (−2.10)
Fpro × Fedu			0.244** (3.17)
$Fpro^2$ × Fedu			0.652* (2.19)
Constant (α_0)	9.151*** (3.36)	9.130** (3.38)	9.140** (3.36)
Ownership (Ows)	Controlled	Controlled	Controlled
Regions (Reg)	Controlled	Controlled	Controlled
Industry (Ind)	Controlled	Controlled	Controlled
Hausman	119.51***	121.04***	124.42***
Adjusted R^2	0.1114	0.1153	0.1169
F	1,265.01***	529.32***	4.92***
Number of firms	469	469	469
Observations	1,047	1,047	1,047

Notes: Probability values are based on a *t*-statistic for a two-tailed test of significance; ***indicates $p < 0.001$; **indicates $p < 0.01$; *indicates $p < 0.05$ (two-tailed *t*-test statistic)

Table II.
Multiple regression of female participation in TMT and firm growth performance

To better analyze the moderating effect of female top managers' education level, this moderating effect is plotted with the following method. We use one standard deviation above and below the mean to represent high and low levels of education level based on the coefficients in Model 3. Figure 1 is finally obtained.

Figure 1 shows that the inverted U-shaped relationship between female participation in TMT and growth performance is positive and is significant at a high level, while this
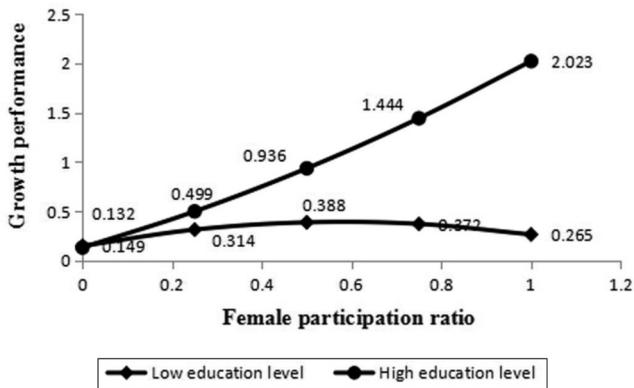

Figure 1.
Moderating effect to inverted U-shape relationship

relationship is insignificant at a low level. This suggests that the moderating effect of education level does exist. In other words, when the education level of female top managers is high, the phenomenon "going too far is as bad as not going far enough" is weakened.

Robustness checks
To ensure the reliability of empirical results, we use the 432 firms which have female top managers as the sub-sample to perform the robustness test. We repeat the previous regression with the sub-sample and find that the regression result is not significantly different from the previous results in Table II.

Conclusion
The purpose of this paper is to examine the relationship between female participation in TMT and SMEs' growth performance within the context of China particularly, to investigate the moderating effects of education level of female top managers in this relationship. We analyze the public panel data from 469 listed SMEs during the year from 2011 to 2013. Our results reveal that a more balanced gender composition in TMT is associated with higher growth performance rather than proportional dominated by gender. Our results also highlight the role played by the education level of female top managers in the relationship between female participation in TMT and the SMEs growth performance. In fact, the education level of female top managers weakened the moderating effect on the inverted U-shaped relationship, which means that the lower education level of female top managers have, the more significant the inverted U-shaped relationship will be.

This paper provides implications for theory development and practical management. From a theoretical viewpoint, this paper extends the existing literature about the growth of SMEs and also broadens the scope of female entrepreneurial performance studies. We empirically test the positive effect that a female brings in SMEs under the context of China, and this will provide inspiration to carry out relevant international comparative study.

From a practical perspective, we emphasize the importance of female executives and their education level for the growth of SMEs. This provides useful empirical guidance for the Chinese policymakers, regulators and corporate decision makers concerning TMT gender diversity in SMEs. These results also help them to realize the importance of female executives for firm growth and, in particular, become aware of benefit of the high education level of female executives to firm growth.

Despite the contributions mentioned above, there are also some limitations. First, this research only considers the effect of education level of female executives, and the education level is just one aspect of human capital. The experience and skills of female executives may also have influence on the growth performance; future research should examine the impact of female executives' human capital on the growth performance from multiple dimensions. Second, this research primarily focus on the gender characteristics of top manager team, but other factors such as behavior of top manager team, environments and culture are not examined. In future research, we will have a more complete understanding of these factors. Finally, our sample only contains listed SMEs in Shenzhen Stock Exchanges, and these firms usually develop in good condition. Future study should expand the range of objects and use the sample containing all stages of SMEs for further study.

References

Alowaihan, A.K. (2004), "Gender and business performance of Kuwait small firms: a comparative approach", *International Journal of Commerce and Management*, Vol. 14 Nos 3/4, pp. 69-82.

Aterido, R. and Hallward-Driemeier, M. (2011), "Whose business is it anyway? Closing the gender gap in entrepreneurship in Sub-Saharan Africa", *Small Business Economics*, Vol. 37 No. 4, pp. 443-464.

Bardasi, E., Sabarwal, S. and Terrell, K. (2011), "How do female entrepreneurs perform? Evidence from three developing regions", *Small Business Economics*, Vol. 37 No. 4, pp. 417-441.

Campbell, K. and Mínguez-Vera, A. (2008), "Gender diversity in the boardroom and firm financial performance", *Journal of Business Ethics*, Vol. 83 No. 3, pp. 435-451.

Carter, D.A., Souza, F., Simkins, B.J. and Simpson, W.G. (2010), "The gender and ethnic diversity of US boards and board committees and firm financial performance", *Corporate Governance: An International Review*, Vol. 18 No. 5, pp. 396-414.

Camelo-Ordaz, C., Hernández-Lara, A.B. and Valle-Cabrera, R. (2005), "The relationship between top management teams and innovation capacity in companies", *Journal of Management Development*, Vol. 24 No. 8, pp. 683-705.

Coleman, S. (2007), "The role of human and financial capital in the profitability and growth of women-owned small firms", *Journal of Small Business Management*, Vol. 45 No. 3, pp. 303-319.

Coleman, S. and Robb, A. (2009), "A comparison of new firm financing by gender: evidence from the Kauffman firm survey data", *Small Business Economics*, Vol. 33 No. 4, pp. 397-411.

Gardiner, D.M. and Tiggemann, M. (1999), "Gender differences in leadership style, job stress, and metal health in male- and female-dominated industries", *Journal of Occupational & Organizational Psychology*, Vol. 72 No. 72, pp. 301-315.

Hambrick, D.C., Cho, T.S. and Chen, M.J. (1996), "The influence of top management team heterogeneity on firms' competitive moves", *Administrative Science Quarterly*, Vol. 41 No. 4, pp. 659-684.

Hillman, J.A., Cannella, A.A. and Paetzold, R.L. (2000), "The resource dependence role of corporate directors: strategic adaption of board composition in response to environmental change", *Journal of Management Studies*, Vol. 37 No. 3, pp. 235-255.

Hillman, J.A., Shropshire, C. and Cannella, A.A. (2007), "Organizational predictors of women on corporate boards", *Academy of Management Journal*, Vol. 50 No. 4, pp. 941-952.

Hu, W., Zhang, Y. and Yang, J. (2014), "Is homogeneity or heterogeneity? a study on the adjustment function of the relationship between the technical entrepreneurial team and new ventures' performance", *Management World*, Vol. 6, pp. 92-109.

Joy, L., Carter, N.M. and Wagner, H.M. (2007), "The bottom line: corporate performance and women's representation on boards", *Catalyst*, Vol. 9 No. 3, p. 16

Liu, X. and Li, W. (2010), "Review of women board directors and corporate governance", *Foreign Economics & Management*, Vol. 32 No. 4, pp. 47-53.

Lückerath-Rovers, M. (2013), "Women on boards and firm performance", *Journal of Management & Governance*, Vol. 17 No. 2, pp. 491-509.

Martínugedo, J.F. and Minguezvera, A. (2014), "Firm performance and women on the board: evidence from Spanish small and medium-sized enterprises", *Feminist Economics*, Vol. 20 No. 3, pp. 136-162.

Pfeffer, J. (1972), "Size and composition of corporate boards of directors: the organization and its environment", *Administrative Science Quarterly*, Vol. 17 No. 2, pp. 218-228.

Pfeffer, J. and Salancik, G.R. (1978), "The external control of organizations: a resource dependence perspective", *Economic Journal*, Vol. 4 No. 2, pp. 309-310.

Ping, Z. and Qihong, W. (2012), "The impact of female executives participation on technological innovation: evidence from Chinese GEM companies", *Studies in Science of Science*, Vol. 30 No. 5, pp. 773-781.

Robb, A. and Coleman, S. (2009), "Financing strategies of new technology-based firms: a comparison of women- and men-owned firms", *Journal of Technology Management & Innovation*, Vol. 5 No. 1, pp. 30-50.

Singh, S.P., Reynolds, R.G. and Muhammad, S. (2001), "A gender-based performance analysis of micro and small enterprises in java, indonesia", *Journal of Small Business Management*, Vol. 39 No. 2, pp. 174-182.

Smith, N., Smith, V. and Verner, M. (2006), "Do women in top management affect firm performance? a panel study of 2,500 Danish firms", *International Journal of Productivity and Performance Management*, Vol. 55 No. 7, pp. 569-593.

Ting, R. and Zheng, W. (2010), "Female participation in TMT and firm performance: evidence from Chinese private enterprises", *Nankai Business Review*, Vol. 13 No. 5, pp. 1-91.

Zwan, P.V.D., Verheul, I. and Thurik, R. (2012), "The entrepreneurial ladder, gender, and regional development", *Small Business Economics*, Vol. 39 No. 3, pp. 627-643.

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