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A Study on the Effect of TMT Characteristics and Vertical Dyad Similarity on Enterprise Achievements

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Abstract: The top management team (TMT) is a key resource for an enterprise's sustainability, and the study of TMT characteristics is very important to explain the factors involved in an enterprise's development. In order to comprehensively evaluate the impact of TMT characteristics on enterprise performance in China, the effect of average characteristics and vertical dyad characteristics of TMTs on enterprises performance was researched in this paper. This study is based on upper echelon theory, the similarity–attraction paradigm, and social categorization theory, stemming from the dual perspectives of social psychology and social politics. The concept of chairperson–TMT vertical dyad similarity is first proposed as a TMT characteristic, and the effect of vertical dyad similarity on enterprise performance is empirically analyzed using panel data from 235 manufacturing small- and medium-sized enterprise (SME) samples. The findings demonstrated that TMT average tenure, TMT age vertical dyad similarity, and tenure vertical dyad similarity have a significant positive effect on enterprise performance, while TMTs' other average characteristics and chairperson–TMT vertical dyad differences have no significant effect on enterprise performance.

Keywords: top management team; vertical dyad similarity; enterprise performance; vertical dyad difference, upper echelon theory

1. Introduction

It is very important to identify the characteristics of the top management teams (TMTs) that have a significant impact on enterprise performance (EP), and a great effort has been made towards this over the past three decades. The TMT directly affects enterprise competitiveness and future sustainability since it is at the heart of enterprise decision making and development. In a complex business environment, TMTs' strategic choices and implementation of enterprise strategy are influenced by their perceived ability, cognitive ability, demographic diversity, experience, values, and so on.

Hambrick and Mason [1] pioneered a new way of studying the relationship between TMT background characteristics and enterprise governance and EP by proposing an upper echelon theory in 1984. Tihanyi et al. [2] pointed out that firms with a higher average TMT age would formulate a more conservative enterprise strategy and lose good market opportunities, and that firms with a

TMT that has a higher average elite education would formulate strategies conducive to enterprise development as they get more effective information. Jahanshahi and Brem [3] demonstrated that the TMT average tenure and average educational level are effective factors in explaining TMT innovation.

Sambharya [4] found that a high level of overseas experience in the TMT supports the enterprise's internationalization process and increases its chances of success. A large number of studies on the relationship between TMT characteristics and EP have shown that TMT demographic characteristics (age, education level, tenure, and gender) can largely explain the impact of top managers on enterprise performance [5–7]. Since top managers who are superior in personal ability, tenure, and interpersonal relationships usually have a great impact on the selection of enterprise strategies with the CEO, the final strategic choice is the result of a game involving different powers within the TMT.

The heterogeneity of the TMT, along with the average characteristics of the TMT, also influences EP by affecting the team members' information gathering, processing, and exchange frequency [1,8–11]. Ferries [12] found that the heterogeneity of team demographic characteristics was positively correlated with the frequency of an enterprise's competitive strategy use, and Boone's study [13] shows that high heterogeneity of the TMT can reduce subsequent EP. The lack of TMT diversity in terms of expertise and knowledge has also been found to be a source of business failure [14,15]. TMT heterogeneity may result in a better performance for growing enterprises, but high heterogeneity increases the possibility of conflicts within the team and can lead to team instability due to high team management costs (such as frequent handling of conflicts within the team). Wiersema and Bird [16] found that the individual's perception of psychological impacts on demographic characteristics difference varied according to cultural background because demographic characteristics affected organizational output by influencing the process of individual socialization.

In upper echelon theory, the mean or heterogeneity characteristics of the entire TMT are used under the assumption that the preferences of all team members are consistent, but this is clearly not in line with reality. Even if demographic characteristics differences are the same, these differences may have different implications for the relationships between individuals of the same status and of different status [17]. The similarity–attraction paradigm, which was originally proposed by Byrne [18], regards similarity as an important element of interpersonal attraction and highlights that team members judge each other's attitudes, values, and beliefs based on similarity in communication and interpersonal interaction processes. It forms the basis of social classification and related association models [19]. Tsui [20] proposed a self-categorization theory stating that individuals tend to categorize themselves into different social groups based on demographic characteristics and that individuals perform self-perception according to the characteristics of the group to which they belong [21]. Carpenter et al. [22] found that there are some adjustment variables between the demographic characteristics of the TMT and organizational performance, which are neglected by upper echelon theory. Research on the vertical dyad difference between CEO and other top managers according to the position hierarchy increases the explanatory power of the effect of TMT characteristics on enterprise performance. Hambrick [23] proposed that TMTs' characteristics and power structures directly influence their decision making for enterprise strategy and that TMTs should be described and measured by demographic characteristics and the power structures. Brew and David [24] have proven that people's interactions in Chinese society are highly influenced by status because people are very sensitive to hierarchy and authority. Positions play a key role in individual interactions between team members because they determine the formal role of an individual in an organization. Yang and Wang [25] argued that communication and discussion about strategic decision making will be reduced within TMTs with large vertical dyad differences because the chairpersons of these teams have a greater influence in the decision-making process.

Vertical dyad differences, which are commonly used to measure the degree of communications and interpersonal interactions between the chairperson of the board and TMT members, do not accurately represent the quality of chairperson–TMT interactions [26,27]. In particular, when the characteristics of individual TMT members are very different from those of the chairperson of the

board but the average characteristics of the TMT are similar to that of the board chairperson, the vertical dyad differences are evaluated as good interactions between them. In other words, the vertical dyad differences ignore the presence of members who can interact well with the chairperson within TMT. In order to remedy the drawbacks of traditional studies, defining new indicators of vertical dyad similarity within TMT and examining its impact on EP will be of unique and important value. In this paper, we propose a vertical dyad similarity defined by the number of TMT members who can interact well with the chairperson in consideration of the hierarchy, and we study the effect of TMT average and vertical dyad similarity characteristics on EP. The innovation of this paper is that the concept of vertical dyad similarity is firstly proposed to accurately reflect the vertical dyad characteristics of TMT. A major finding is that the chairperson–TMT vertical dyad similarity has a greater effect on EP than the vertical dyad difference. This paper provides a systematic and comprehensive view of the importance of TMTs in corporate development, offering a theoretical basis and empirical evidence for EP.

2. Literature Review and Hypothesis Development

2.1. TMT Average Characteristics and Enterprise Performance

2.1.1. Age

The age of a manager can reflect their past professional experience, limited rationality, and antirisk ability and so influences behavior choice. In general, young managers will be driven to choose adventurous and innovative business decisions based on their passion, but old managers will pay more attention to the financial and occupational safety and tend to avoid risk. Hambrick and Mason [1] have confirmed that an increase in manager age leads to a decrease in cognitive ability and adaptive capacity. Wiersema and Bantel [7] found that older managers, compared with younger managers, are more risk-averse, implement a more stable business strategy and development model, and reduce the company's strategic shift. Barker and Mueller [28] found that the average age of TMT was negatively correlated with the tendency to participate in innovation strategies. Young managers are generally quick-minded and innovative, while older managers are generally more comprehensive and conservative.

Based on the above discussion, we propose the following hypothesis:

Hypothesis 1a (H1a). *There is a negative relationship between TMT average age and EP.*

2.1.2. Gender

With the development of the time, the power of women in Chinese business circles has gradually risen, and many women are joining TMTs with their abilities. Women's inherent flexible management characteristics can better encourage TMTs to make a series of decisions to help enterprises to adapt to the changing environment, and to help enterprises to obtain economic profits [29,30]. Generally, risk preference and risk perception are different between men and women. Byrnes et al. [31] presented evidence that under the same risk, men are generally willing to accept challenges and actively participate in adventure, but women are afraid of risk and refuse it. Meyers [32] found that women's information processing process, compared with men's information processing, is more complex and detailed, and more evidence is needed to confirm the cognitive process. Based on resource dependence theory, Rosener et al. [33] found that women's TMT participation could help enterprises to better understand markets and customers and enable enterprises to rapidly promote new products to the market. They also found that female managers are good at emotional expression and relatively little bureaucratic style in terms of internal management, which helps to create a good atmosphere for innovation and improve team creativity. Adams et al. [34] found that enterprises with a high percentage of women on the board of directors would be more efficient in supervising the board of directors and improve their corporate governance efficiency.

Based on the above discussion, we propose the following hypothesis:

Hypothesis 1b (H1b). *The proportion of women in TMT positively influences EP.*

2.1.3. Educational Level

Educational level can reflect a person's knowledge base, cognitive ability, information integration ability, and decision-making ability. It is also closely related to their ability to accept new ideas, adapt to changes in the environment, and handle information. Wiersema and Bantel [7] suggested that highly educated managers would get more resources and supports through social relations and diversify their business. Pearce [35] mentioned that educational level and academic achievement have been emphasized as a part of personal success in China because the Chinese have been greatly influenced by Confucianism. Tihanyi et al. [2] found that the higher the educational level of top managers, the higher the cognitive complexity and the higher management's reputation. Managers with higher educational level can more accurately determine the position of enterprises in a complex business environment, thus bringing significant positive impact on the strategic development of enterprises. We believe that managers with different educational levels make different choices about company strategy and that highly educated TMT will be more rational and have higher business capability.

Thus, we propose the following hypothesis:

Hypothesis 1c (H1c). *There is a positive relationship between TMT's average educational level and EP.*

2.1.4. Tenure

Tenure of office is an important determinant in TMT operation. Miller et al. [36] found that long-tenure managers are more aware of the company and less likely to be deviated from core competitiveness. Hambrick [23] and Boeker [37] argued that top managers with a short tenure are more willing to break the original management mode and make strategic changes than top managers with a long tenure. Fraser [38] found that the longer the managers' tenure of office was, the more familiar they were with the company, the more managerial experience they had, and the less likely they were to make mistakes in corporate decision making. Different tenure of managers means that managers have a different understanding of the company and development stages of company, and this difference is reflected in corporate policies, strategies, cultures, and values. Managers will devote themselves to exploring a specific fundamental management paradigm at the beginning of their tenure and progressively build their own management paradigm and unique value judgement along with the increase of tenure. In this paper, we suggest that long tenure and management experience can enable the manager to be aware of the corporate operating environment and internal conditions and thus make a reasonable decision for the corporation.

Thus, we propose the following hypothesis:

Hypothesis 1d (H1d). *There is a positive relationship between TMT's average tenure and EP.*

2.2. TMT Vertical Dyad Differences and Enterprise Performance

Vertical dyad differences of TMT, which mean the differences in demographic characteristics between the superior member and subordinate members within the top management team, emphasize the hierarchical relationship of the team and hold that managers at different levels have a different status and rights. Organizational structure theory points out that the role orientation of an individual in an organization depends largely on its formal position within the organization. The relationship between TMT characteristics and EP is most evident in vertical dyads between the superiors and subordinates, as the performance expectations and evaluation criteria of subordinate members are mainly determined by superiors. On the basis of the upper echelon theory, Tsui and O'Reilly [19] first introduced vertical dyad characteristics into TMT members' demographic characteristics and found that some qualified differences could also have positive impacts on EP. They have shown that in vertical dyads of working groups, not only will similarity have a positive effect, but also differences that meet certain conditions can bring a positive effect on EP. Green et al. [39] found

that gender differences between the superior and subordinates lead to a decline in the quality of superior–subordinate relationships. Tsui and his research team argued that positive results will be achieved when there are differences in demographic characteristics conforming to social norms, such as a superior’s higher level in education and older age than subordinates [40–43]. Epitropaki et al. [44] suggested that the greater the vertical dyad difference of tenure, the lower the work attributes and well-being of members. Werbel et al. [45] proposed that state differences between superior and subordinates would shake the trust relationship between them, thus further affecting the quality of the relationship between them. Guthrie and Datta [46] presented that age vertical dyad difference would affect the strategic choice adopted by CEOs when faced with risks.

Based on the above discussion, we propose the following hypothesis:

Hypothesis 2a (H2a). *The chairperson–TMT vertical dyad difference of age is positively related to EP.*

Hypothesis 2b (H2b). *The chairperson–TMT vertical dyad difference of gender is negatively related to EP.*

Hypothesis 2c (H2c). *The chairperson–TMT vertical dyad difference in educational level is positively related to EP.*

Hypothesis 2d (H2d). *The chairperson–TMT vertical dyad difference of tenure is negatively related to EP.*

2.3. TMT Vertical Dyad Similarities and Enterprise Performance

The concept of TMT vertical dyad similarities has been proposed based on the similarity–attraction paradigm, the upper echelon theory, and the social categorization theory. The similarity–attraction paradigm proposed by Byrne [18] emphasizes that individuals with similar characteristics are more likely to attract each other and generate good interpersonal interactions between team members from psychological perspectives. According to the upper echelon theory [1–7], TMTs are the key resource for enterprise decision making and development, and TMT background characteristics greatly affect enterprise competitiveness and performance. Social categorization theory [20,21] suggests that individuals tend to categorize themselves into different social groups. Considering three theories with a hierarchical relationship within the TMT, we can see that TMT vertical dyad similarities have a significant effect on EP. On the existing research literature, we can easily find that interpretation of a “vertical dyad” mainly depends on the similarity principle and that most of the TMT characteristics influence team effectiveness through the interpersonal interactions among the TMT members.

Stewart [47] pointed out that a great similarity would increase interpersonal interactions and effectiveness by allowing more frequent and smoother contact between TMT members. Demographic characteristics are good criteria for judging the similarity of individual characteristics due to being easy to identify and accurate to measure. Unlike the vertical dyad difference calculated only by the average value of TMT members’ characteristics, the vertical dyad similarity is referred to as the number of TMT members whose demographic characteristics are similar to the board chairperson. Whether EP is affected by the vertical dyad similarities based on the power structures between board chairperson and TMT members is investigated in this paper. Crosslad and Smith [48] found that the higher the similarity of demographic characteristics within a team, the more likely it will be to produce positive effects such as strong team cohesion, good strategic decision making, and improved organizational performance. Bedi [49] suggested that demographic diversity (such as gender) between the superior and subordinates had a negative impact on the quality between leader and members. Cohen et al. [50] studied individual strength and found that the opportunity to interact with similar people and the closeness of working relationship increase significantly. Lankau et al. [51] used gender, race, education, position, and background as similarity measures of team members to study the formal guidance relationship between mentors and protégés. Powell et al. [52] suggested that gender similarity has a significant impact on the recruitment process, since recruiters have a significant preference in the interactions with same-gender candidates during the interview process. According to the principle of similarity–attraction, we propose that TMT members with similar demographic characteristics to

the board chairperson help to encourage the chairperson–TMT relationship development and play an important role in making management team cooperation and exchange more harmonious.

Thus, we propose the following hypothesis:

Hypothesis 3a (H3a). *The chairperson–TMT vertical dyad similarity of age is positively related to EP.*

Hypothesis 3b (H3b). *The chairperson–TMT vertical dyad similarity of gender is positively related to EP.*

Hypothesis 3c (H3c). *The chairperson–TMT vertical dyad similarity of educational level is positively related to EP.*

Hypothesis 3d (H3d). *The chairperson–TMT vertical dyad similarity of tenure is positively related to EP.*

3. Data and Methodology

3.1. Research Samples and Data Sources

In order to effectively test the relationship between TMT characteristics and EP, private manufacturing enterprises were selected among the sample data of small- and medium-sized enterprises (SMEs) listed on Shanghai and Shenzhen Stock Exchanges in China from 2017. SMEs were chosen as research samples because they are a new growth point for the Chinese economy and depend on TMT management and decision-making ability over other companies due to their unique management system [53]. Compared to other industries, there is a large number of manufacturing companies listed, which can provide enough sample observations for this study. Private companies are profit-driven and more aggressive in improving business performance and naturally resisting government intervention, so they allowed our research to compare with Western literature.

Wong et al. [54] suggested that the chairperson of the board is the representative of an enterprise and that they have the greatest decision-making power in terms of power structures and allocation of listed companies in China. Similarly, according to the provisions of company law of China, the chairperson of the board is the legal representative of a listed company and has the substantive final decision-making authority, so the person most influential in strategic decision making is usually the chairperson of the board, not the general manager. For this reason, vertical dyad characteristics of TMT in this paper refer to the differences and similarities of demographic characteristics between the chairperson and top management team. Four measurement indicators, including age, gender, educational level, and tenure, were set up to explore the influence mechanism of vertical dyad characteristics on EP.

In order to eliminate the deviations caused by abnormal samples, the following original samples were removed: (1) SME-listed companies with abnormal or insufficient TMT data; (2) Companies with negative net assets; (3) ST (Special treatment) companies; (4) Enterprises with a change of chairperson or general manager in 2017; (5) Companies with many TMT members (over 30%) replaced in 2017.

Finally, 235 valid samples were obtained. The data of TMT characteristics and EP were taken from the Wind database and companies' annual reports. Other missing TMT data were referenced in the relevant network. In order to eliminate the influence of extreme values, we Winsorized all continuous variables at the 1st and 99th percentiles.

3.2. Variable Measurement

3.2.1. Dependent Variable

Our research used enterprise performance (EP) as the only dependent variable [55]. In order to calculate EP, we used return on assets (ROA) for the corresponding fiscal year, which is calculated as operating income after depreciation divided by book value of assets [56].

3.2.2. Independent Variables

The top management team is defined as the senior managers included in the company's annual report, including the chairperson, vice-chairpersons, general manager, deputy general managers, financial director, supervisor board secretary, etc.

The average age (AAGE), gender (AGen), average educational level (AEdu), and average tenure (ATenu) were used to represent the TMT's average characteristics. AGen was measured as the ratio of male to the total number of TMT members. AEdu was measured as the average number of academic qualifications. The method of evaluation is as follows: "Junior high school or below 1, College 2, Undergraduate 3, Master 4, Doctorate 5" [57].

TMT vertical dyad differences refer to the differences between the chairperson and other team members in four dimensions, including age vertical dyad difference (DiffAge), gender vertical dyad difference (DiffGen), education vertical dyad difference (DiffEdu), and tenure vertical dyad difference (DiffTenu). DiffAge refers to the value of the chairperson's age minus TMT average age; DiffGen refers to the value of the chairperson's gender minus TMT average gender; DiffEdu refers to the value of the chairperson's educational level minus TMT average educational level; DiffTenu refers to the value of the chairperson's tenure minus TMT average tenure (detailed definition is shown in Table 1).

Table 1. Variable definition.

Variable	Symbol	Definition
TMT average characteristics	AAGE	Age sum of TMT members/Total number of TMT
	AGen	Number of males in TMT/Total number of TMT
	AEdu	Sum of academic qualifications of TMT members/Total number of TMT, in which Junior high school or below 1, College 2, Undergraduate 3, Master 4, Doctorate 5
	ATenu	Sum of tenures of office of TMT/Total number of TMT
TMT vertical dyad differences	DiffAge	Chairperson's age – TMT average age
	DiffGen	Chairperson's gender – TMT average gender, in which Male 1, Female 0
	DiffEdu	Chairperson's academic qualification – TMT average educational level
	DiffTenu	Chairperson's tenure of office – TMT average tenure
TMT vertical dyad similarities	SimAge	Number of members satisfying $(\text{chairperson's age} - \text{member's age} < 5)$ /Total number of TMT
	SimGen	Number of members satisfying (chairperson's gender = member's gender)/Total number of TMT
	SimEdu	Number of members satisfying (chairperson's education = member's education)/Total number of TMT
	SimTenu	Number of members satisfying (chairperson's tenure = member's tenure)/Total number of TMT
Enterprise size	Size	Natural logarithm of its total assets
TMT size	Tsize	Total number of TMT members
Enterprise performance	ROA	Operating income after depreciation/Book value of assets

TMT vertical dyad similarities refer to the ratio between the number of TMT members whose demographic characteristics are similar to those of the board chairperson and the total number of TMT members in four dimensions, including age vertical dyad similarity (SimAge), gender vertical dyad similarity (SimGen), education vertical dyad similarity (SimEdu), and tenure vertical dyad similarity (SimTenu). SimAge is defined as the ratio of the number of TMT members with an age difference of less than 5 years with the chairperson (the absolute value of the chairperson's age minus the member's age is less than five) to the total number of members of the TMT. Members with absolute values of age differences of less than five years than chairperson do not feel that the chairperson is too young or too old compared to themselves. SimGen is defined as the ratio between the number of members of the

same gender as the chairperson and the number of total TMT members; SimEdu is defined as the ratio between the number of members of the same educational level as the chairperson and the number of total TMT members; SimTenu is defined as the ratio between the number of members of the same tenure as the chairperson and the number of total TMT members.

3.2.3. Control Variables

We had two control variables in our model, namely, enterprise size and TMT size. Enterprise size (Size) is measured as a natural logarithm of its total assets at the end of the year, and TMT size (Tsize) is measured as the total number of TMT members. The data of control variables were taken from Wind database.

3.3. Model Construction

The research purpose of this study was to analyze and clarify the relationship between TMT characteristics and EP. To realize this goal, we used the Pearson correlation analysis and hierarchical multiple regression analysis as the research method. The two models are proposed for testing the hypotheses proposed in Section 2.

Firstly, we examined the impact of chairperson–TMT vertical dyad similarities on EP. In order to perform the first step in testing, four indices of vertical dyad similarities were set as independent variables, and all control variables were added in the model. The first model was established as follows:

Model 1:

$$EP = \alpha_0 + \alpha_1 SimAge + \alpha_2 SimGen + \alpha_3 SimEdu + \alpha_4 SimTenu + \alpha_5 Size + \alpha_6 Tsize$$

Next, we investigated the effect of all TMT characteristics on EP and tested all control variables. All independent variables and control variables were added to the model. A second model was proposed as follows:

Model 2:

$$EP = \beta_0 + \beta_1 AAge + \beta_2 AGen + \beta_3 AEdu + \beta_4 ATenu + \beta_5 DiffAge + \beta_6 DiffGen + \beta_7 DiffEdu + \beta_8 DiffTenu + \beta_9 SimAge + \beta_{10} SimGen + \beta_{11} SimEdu + \beta_{12} SimTenu + \beta_{13} Size + \beta_{14} Tsize$$

Excel and Matlab were used to store and sort the collected data, and SPSS was used to compute the correlation matrix and to test the statistical models.

In the above models, we did not consider the moderating effect between variables but only considered the direct effect of TMT characteristics on EP. Thus, the proposed models do not have any cross terms between variables. It is mentioned that the relationship between TMT vertical dyad characteristics and EP may be controlled by several moderating variables, so future research on the moderating effect is required.

4. Empirical Results

4.1. Statistical Findings

Before the regression analysis, we first performed the descriptive statistics and correlation analysis.

Table 2 shows the results of descriptive statistical analysis of all variables for our sample enterprises. We found that the average education level of TMTs in our sample was 3.22 and mainly concentrated at the university degree level. Their average age was 48.19 years, and their average years of staying in office were 6.38. The average male ratio in our sample was 0.79, indicating male managers still dominate SMEs in China. The dimensions of chairperson–TMT vertical dyad similarities are all between 0 and 1, while all chairperson–TMT vertical dyad differences and ROA had sufficient variation in their value ranges. In control variables, the average size of enterprises was 9.67 and the

standard deviation was 0.354, which presents that the sizes of the enterprise samples studied had little difference. The skewness and kurtosis of most of the indices were in the normal range, with maximum value being less than 3 in skewness and less than 8 in kurtosis, but only the gender vertical dyad difference showed a slight abnormal distribution, with a kurtosis coefficient of 8.15.

Table 2. Descriptive statistics.

Variables	N	Minimum	Maximum	Mean	Std. Deviation	Skewness	Kurtosis
AAGE	235	40.154	56.765	48.187	2.995	0.094	−0.266
AGen	235	0.429	1.000	0.790	0.121	−0.481	−0.134
AEdu	235	2.000	4.353	3.224	0.414	−0.262	0.095
ATenu	235	2.214	10.875	6.377	1.436	0.354	0.610
DiffAge	235	−30.091	17.600	−6.685	8.632	0.021	0.317
DiffGen	235	−0.615	1.000	−0.172	0.266	2.583	8.150
DiffEdu	235	−2.111	2.667	0.041	1.002	0.575	−0.198
DiffTenu	235	−5.938	11.133	3.720	2.625	−0.519	1.228
SimAge	235	0.000	0.833	0.314	0.207	0.326	−0.738
SimGen	235	0.000	1.000	0.744	0.186	−1.535	2.992
SimEdu	235	0.000	0.846	0.327	0.191	0.185	−0.639
SimTenu	235	0.000	0.875	0.322	0.180	0.276	−0.212
Size	235	8.591	11.251	9.671	0.354	0.452	1.140
Tsize	235	8.000	24.000	14.783	2.598	0.543	0.449
ROA	235	−7.448	24.875	5.349	4.849	1.052	1.979

In this paper, correlation between main variables was analyzed using Pearson correlation coefficients, and results are shown in Table 3. Pearson's coefficients range from −0.393 to 0.565 in Table 3 and fall within a reasonable range of less than 0.60, which can help to avoid multicollinearity [58]. In addition, when performing regression analysis, multicollinearity was also checked using VIF (Variance Inflation Factor) values in all models. Since all VIF values are less than 5, there is no multicollinearity problem in the models [59].

We conducted a hierarchical multiple regression analysis to test the hypothesis of this study. We firstly entered only the chairperson–TMT vertical dyad similarities and control variables as the dependent variables to confirm the correlation between newly proposed vertical dyad similarities and EP (see Table 4, Model 1). In Model 1, we found that age vertical dyad similarity ($\beta = 2.046$; $p < 0.05$) showed a positive correlation with EP. This means that the enterprise performance is higher in the TMTs with many members of a similar age to that of the chairperson. We found that tenure vertical dyad similarity ($\beta = 4.325$; $p < 0.01$) also positively related with EP, which highlights that enterprise performance is higher in TMTs with many members with the same tenure as the chairperson. Thus, Hypotheses 3a and 3d were supported. This means that Byrne's similarity–attraction paradigm [18] is also supported in vertical dyad similarities. However, gender vertical dyad similarity and education vertical dyad similarity do not have any significant bearing on the EP. Thus, Hypotheses 3b and 3c were not supported. These results show that in Chinese firms, similarities of age and tenure have a greater impact on corporate performance than similarities of gender and educational level. Detailed interpretations are described in the following subsection.

Table 3. Correlation matrix.

Variables	AAge	AGen	AEdu	ATenu	DiffAge	DiffGen	DiffEdu	DiffTenu
AAge	1							
AGen	0.321 **	1						
AEdu	0.014	0.071	1					
ATenu	0.433 **	0.090	−0.007	1				
DiffAge	−0.066	−0.075	0.101	0.011	1			
DiffGen	0.232 **	0.458 **	−0.039	0.089	0.048	1		
DiffEdu	0.056	0.066	−0.093	−0.048	−0.249 **	0.021	1	
DiffTenu	−0.009	0.033	0.066	0.115	−0.269 **	−0.102	−0.036	1
SimAge	0.030	−0.025	0.169 **	0.016	0.565 **	−0.034	−0.155 *	0.006
SimGen	0.157 *	0.693 **	0.138 *	0.033	−0.115	−0.295 **	0.048	0.114
SimEdu	0.042	0.036	0.205 **	−0.015	0.242 **	0.013	−0.199 **	−0.022
SimTenu	0.291 **	0.087	−0.119	0.191 **	−0.069	0.083	0.053	−0.393 **
Size	0.100	0.143 *	0.197 **	0.060	0.073	0.056	0.055	0.013
Tsize	0.191 **	0.088	0.040	0.095	−0.134 *	0.121	−0.120	0.033
ROA	0.091 *	−0.020	0.045	0.190 **	−0.057	−0.029	0.062	−0.014
Variables	SimAge	SimGen	SimEdu	SimTenu	Size	Tsize	ROA	
SimAge	1							
SimGen	0.012	1						
SimEdu	0.192 **	0.048	1					
SimTenu	0.038	0.005	−0.006	1				
Size	0.116	0.101	−0.027	0.042	1			
Tsize	−0.056	0.024	0.056	0.080	0.231 **	1		
ROA	0.129 *	0.002	−0.072	0.170 **	0.138 *	0.035	1	

** Significant at the 0.01 level. * Significant at the 0.05 level.

Table 4. Regression analysis.

	ROA	
	Model (1)	Model (2)
AAge		0.049
AGen		−3.923
AEdu		0.537
ATenu		0.546 **
DiffAge		−0.078
DiffGen		−0.002
DiffEdu		0.190
DiffTenu		−0.057
SimAge	2.046 *	3.631 *
SimGen	−0.208	0.732
SimEdu	−2.137	−1.572
SimTenu	4.325 **	2.971 **
Size	1.620	1.575
Tsize	0.008	−0.031
F	11.649	8.874
R ²	0.178	0.302
Adjusted R ²	0.093	0.135
p	0.016	0.021

** Significant at the 0.01 level. * Significant at the 0.05 level.

In the second step, we entered the TMT average characteristics, vertical dyad differences, vertical dyad similarities, and control variables as dependent variables (see Table 4, Model 2). From this regression result, we can see the following facts. TMT average tenure reveals a statistically significant positive relationship with EP ($\beta = 0.546$; $p < 0.01$). Therefore, Hypothesis 1d has been fully supported. The TMT average age, average gender, and average educational level do not have a significant

relationship with EP. Thus, Hypotheses 1a–c are not verified. There is no significant correlation between the chairperson–TMT vertical dyad differences and EP, and Hypotheses 2a–d have not been verified yet. This indicates that the vertical dyad differences in our sample cannot accurately evaluate the interpersonal attraction and interactions between upper and lower members in TMT. The relationship between vertical dyad similarities and EP has not changed in Model 2.

4.2. Result Discussion

In this paper, we clarified that TMT average characteristics and vertical dyad similarities have a sufficient effect on EP. In particular, it was revealed that age vertical dyad similarity and tenure vertical dyad similarity have a great influence on EP in the case of Chinese enterprises. Managers with different demographic characteristics have different cognitive abilities, values, attitudes, and beliefs. Our results support that the similarity of vertical dyad will decrease the difficulty of communication among TMT members and positively affect team decision-making ability and cohesion. In previous studies, the vertical dyad differences appeared to affect the EP, but the effect of vertical dyad differences on EP is not significant in our study. In general, subordinates with more similarities with their superior are more likely to be recognized by their superior and to form a harmonious and stable relationship between them. Our results showed that the vertical dyad differences do not accurately evaluate the quality of these interpersonal attraction and communication between superior and subordinates. In terms of indicators of vertical dyad differences, the average of TMT demographic characteristics is only compared to the demographic characteristics of board chairperson, but the relationships between demographic characteristics of individual TMT members and that of chairperson are not specified. For example, we can often see the case when TMT members ages are all significantly different from the chairperson's age, but their average age matches with the age of chairperson. In this case, according to the indicators of vertical dyad differences, there is no vertical dyad difference of age, and so the interactions between the TMTs and chair are evaluated as good. In addition to age vertical dyad difference, these misjudgments of interactive quality within TMT also occur when using indices such as educational level and tenure vertical dyad differences. By contrast, indicators of vertical dyad similarities increase the consideration at individual level by evaluating interactions between the individual members and chairperson.

Our results also showed that communication barriers due to differences in tenure and age are practically present in SMEs in China. The influence of vertical dyad characteristics of age and tenure may be more significant in China, which is related to the system and cultural background of China. Firstly, the traditional idea of “officialdom standard” is deeply rooted in China. Thus, the absolute obedience of subordinates to superiors and the absolute leadership of superiors to subordinates are formed, and so, the two relationships are not a two-way interactive business relationship. Secondly, the selection of top managers of listed companies in China is not fully market-oriented, and the executives' promotion by actual controllers of private companies affects the allocation of rights among top managers and the relationship between superiors and subordinates. This not only makes managers very sensitive to hierarchy but also complicates the relationship between superiors and subordinates.

Of the hypotheses of TMT average characteristics set in the paper, only the hypothesis of the average tenure was verified, and the effects of age, gender, and education average characteristics on EP were not verified. It has been pointed out in several studies that the effects of average age and average gender on EP is unclear in Chinese corporate samples. Hypotheses about vertical dyad similarities of gender and educational level were also not verified in this paper. Although all the hypotheses have not been fully validated, the empirical evidence presented in the paper is of great value in identifying the relationship between TMT characteristics and firm performance in China.

5. Robustness Test

In order to make the conclusion more reliable, we conducted a robustness test. We extended the sample data source. Samples of the above parts were SMEs in the manufacturing industry, while

the same research was conducted again with the extended data of SMEs from several industries (manufacturing, mining, and construction industry) in the robustness test. We also extended the time considered by another three years and collected observations (firm-year observations) during the period between 2014 and 2017. A total of 524 listed companies were selected, and 2096 observations were initially prepared. After removing the samples with abnormal or insufficient data, we eventually gathered 1112 valid samples for robustness testing. All data were taken from the Wind database and companies' annual reports. To consider the dynamic effect, the variable of the Year was added to Models 3 and 4.

Model 3:

$$EP = \alpha_0 + \alpha_1 SimAge + \alpha_2 SimGen + \alpha_3 SimEdu + \alpha_4 SimTenu + \alpha_5 Size + \alpha_6 Tsize + \alpha_7 Year$$

Model 4:

$$EP = \beta_0 + \beta_1 AAge + \beta_2 AGen + \beta_3 AEdu + \beta_4 ATenu + \beta_5 DiffAge + \beta_6 DiffGen + \beta_7 DiffEdu + \beta_8 \cdot DiffTenu + \beta_9 SimAge + \beta_{10} SimGen + \beta_{11} SimEdu + \beta_{12} SimTenu + \beta_{13} Size + \beta_{14} Tsize + \beta_{15} Year$$

The results of multiple regression analyses are shown in Table 5. From Table 5, we can see that verification results obtained from the SME sample during the period between 2014 and 2017 are in agreement with the previous one from Table 4.

Table 5. Robustness test.

	ROA	
	Model (3)	Model (4)
AAge		0.127 *
AGen		1.846
AEdu		0.538
ATenu		0.693 **
DiffAge		−0.114
DiffGen		−1.856
DiffEdu		0.347
DiffTenu		−0.069
SimAge	0.629 *	2.088 *
SimGen	0.659	−2.820
SimEdu	−1.903 *	−1.600
SimTenu	4.301 **	3.336 **
Size	0.883 *	0.729
Tsize	0.090	0.091
Year	−0.082	−0.306
F	17.999	21.045
R ²	0.148	0.223
Adjusted R ²	0.120	0.197
p	0.000	0.000

** Significant at the 0.01 level. * Significant at the 0.05 level.

Because unbalanced panel data were used in this section, a Sargan–Hansen test was performed to identify the individual effects. Fixed effects were used to estimate individual effects in the model after changing the source of the sample data. The positive and negative signs and significance of relevant variables have not changed. This shows that regression results of the original model are good, robust, and convincing.

6. Conclusions

In this study, we investigated the effect of TMT characteristics on enterprise performance based on upper echelon theory, the similarity–attraction paradigm, and social categorization theory.

We proposed the concept of vertical dyad similarity, which reflects the power structures within TMTs, and verified its impact on EP. We used panel data from 235 manufacturing SMEs samples to empirically analyze the effect of TMT characteristics on EP. The regression results are as follows: First, TMT average tenure has a significant positive effect on EP. Second, TMT's average age, average gender, and average educational level have no significant effect on EP. Third, chairperson–TMT vertical dyad differences have no significant effect on EP. Fourth, TMT age vertical dyad similarity and tenure vertical dyad similarity have significant positive effects on EP. Fifth, TMT gender vertical dyad similarity and educational level vertical dyad similarity have no significant effect on EP.

These results are consistent and unique to the management structure of Chinese SMEs, where the chairperson of the board is the core decision maker of the company instead of the general manager. Our findings show that the EP is higher in TMTs with many members of similar age and tenure as the chairperson.

Our expectations of gender vertical dyad similarity and education vertical dyad similarity on the EP are not somewhat met. Future thorough investigations will be needed to reveal more about how gender vertical dyad similarity and educational level vertical dyad similarity may affect different aspects of EP.

Through the study outlined in this paper, we identified the following insights: (1) Compared to the main board listed companies, SMEs are small and have low listing threshold, but they have strong innovation ability and great development potential, making them great contributors to the market economy. Therefore, we should focus on the factors affecting SMEs performance in order to effectively promote the sound development of SMEs. (2) Since vertical dyad similarities of TMT play an important role in the performance of SMEs, we should use this principle appropriately in order to make the most of TMT initiative and enhance its positive effect on EP.

Although the paper has made many advances in the research of TMT, it has still some limitations. We only collected data from SMEs in China and did not generalize our study to other types of enterprises. It may be profitable for future studies to test these relationships in large-sized enterprises. The relationship between TMT vertical dyad characteristics and EP may be controlled by several moderator variables, but it has not been thoroughly investigated in this paper, which is also a direction of future research.

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