

Entrepreneurial Capability Scale and New Venture Performance: The Moderating Role of Entrepreneurship education

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Abstract. *This study presents a model involving four distinct elements of entrepreneurial capability: passion and self-achievement, integrity and commitment, leadership and management, and active learning and analysis. By conducting studies across several cities in China, this study develops and validates a 30-item entrepreneurial capability scale to capture the four dimensions, then uses the new scale to examine the antecedent and consequence of entrepreneurial capability. Results show the positive relationship between prior experience and entrepreneurial capability, and between entrepreneurial capability and new venture performance. Entrepreneurship education in university moderates the positive effect of entrepreneurial capability on new venture's management performance. The resultant instrument provides researchers with a useful measurement tool for evaluating entrepreneurial capability.*¹

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Introduction

Entrepreneurship has been an emerging issue both in research and practice in China, especially in these years. Chinese government has brought out the policy of “Mass Entrepreneurship” as the new economic engine of Chinese economy. However, the failure rate of new venture cannot be ignored [1]. Even if new venture could survive, they can hardly perform well [2]. In examining influencing factors of new venture performance, several researchers have discussed the effect of entrepreneurial capability [3-5]. However, there has not reached a widely acceptable agreement on the concept of entrepreneurial capability (EC). Some researchers focus on firm’s capacity, introducing the concept of entrepreneurial capacity as a firm’s capacity to sense, select, and shape opportunities, and synchronize their strategic moves and resources in pursuit of these opportunities [5]. This firm-level definition of entrepreneurial capacity has some overlap with dynamic capabilities [6]. Furthermore, where does this “firm’s entrepreneurial capability” come from? As most of new venture formed mainly by the entrepreneurs themselves, the influence of entrepreneurs’ characteristics on new venture performance cannot be ignored. The central role of the entrepreneur in determining firm performance has been studied by several researchers [7, 8]. Several researches has noticed the important role of entrepreneurs’ characteristics in new venture, by proposing the concept of entrepreneurial passion [9], or the concept of entrepreneurial alertness [10] and examined the prior knowledge as its antecedents, and firm’s innovations as its consequences. However, these two concepts about entrepreneur’s characteristics cannot capture the whole view of entrepreneurs’ characteristics. As the role of entrepreneurs in new venture is not only having passion towards the firm, or having alertness to acquiring new opportunities, but also, seizing business opportunities, and exploiting and configuring existing resources to maximize firm performance [11]. Previous researches on entrepreneurial capability (EC) attempts to take the whole process view of entrepreneurs’ characteristics in new venture, including from the aspect of entrepreneur characteristics [12], the aspect of entrepreneurial opportunity [3], the aspect of learning [13], the aspect of contextual factors [14], and the aspect of network relationships [15].

This study aims at developing a theoretical reasonable measurement of entrepreneurial capability, by first reviewing existing literatures in this area, and then summarizing and defining the

concept of entrepreneurial capability. From this foundation, we propose that entrepreneurial capability consisting of four distinct elements: passion and self-achievement, integrity and commitment, leadership and management, and active learning and analysis. We then develop a scale with solid psychometric properties on individual entrepreneur-level, which is different from previous firm-level scales developed by other researchers. Our research reports two studies to develop and validity a scale for entrepreneurial capability. In Study 1, we first use expert interviews to generate 41 items, and then employs exploratory factor analysis and then confirmatory factor analysis to assess reliability and factor structure. The revised scale is then be used in Study 2 to test nomological validity of entrepreneurial capability, by examining prior knowledge acting as its antecedents, and new venture performance acting as its outcomes. After that, we further test the moderating role of entrepreneurship education in the relation between entrepreneurial capability and new venture performance, and propose that to entrepreneurs who have received entrepreneurship education during in universities, the positive effect of their entrepreneurial capability on their new venture's performance would be stronger than those have not received entrepreneurship education.

Our study makes several contributions to entrepreneurial capability research. First, we offer a specific scale which could help researchers to grasp the dimensions of entrepreneurial capability and its implications. Second, we also discusses the antecedents and consequences of entrepreneurial capability. Third, we propose the moderating role of university entrepreneurship education in the relation between entrepreneurial capability and new venture performance, which indicates the importance and meaning of entrepreneurship education in universities.

State-of-the-Art

Entrepreneurial Capability. We argue that the concept of “competitiveness” or “competencies” is too broad for studying entrepreneurial capabilities. “Competitiveness” could also be used at various levels of study, such as the firm level, the industry level, and even the national level [7, 16]. As for entrepreneurial capabilities include several subtle human characteristics which could hardly been seen as one type of competency [17]. Meanwhile, as competitiveness is always ultimately concerned with the long-term performance [7], which is not a quite perfect measurement for new venture as few of new venture could survive to have long-term performance. Thus, to measure new

venture performance, without solid external data source or annual reports, using entrepreneurs' own perceptions might be more appropriate.

We summarize existing literature related to entrepreneurial capability. The results reports in Table 1. As Table 1 shows, most researches on entrepreneurial capability take the firm-level research, meanwhile, major amounts of researches are theoretical research or case study, without solid empirical test. Thus, this paper aims to focus on individual entrepreneur-level capability, and take conductive studies to test reliability and validity using empirical research.

Table 1

Summary of researches related to entrepreneurial capability

Construct	Definition	Dimensions	Researchers	Research type
Entrepreneurial capability	firm's capacity to sense, select, and shape opportunities, and synchronize their strategic moves and resources in pursuit of these opportunities	Sensing, Selecting, Shaping, and Synchronizing	Abdelgawad et al. (2013); Zahra, Abdelgawad, & Tsang (2011)	Theoretical research
Entrepreneurial competency	a higher-level characteristic encompassing personality traits, skills and knowledge, can be seen as the total ability of the entrepreneur to perform a job role successfully.	Entrepreneurial, Opportunity, Relationship Conceptual, Organizing, Strategic, and Commitment competencies	Man, Lau, & Chan (2002)	Theoretical research
International entrepreneurial capability	Firm-level ability to leverage resources via a combinations of innovative, proactive, and risk-seeking activities to discover, enact, evaluate, and exploit business opportunities across borders.	International experience, international marketing capability, international learning capability, networking capability, and innovative and risk-taking capability	Zhang et al. (2009)	Empirical research with survey
Entrepreneurial capability	A micro-foundation for dynamic capability and includes creative search	Opportunity identification and enacting,	Woldesenbet, Ran, & Jones (2012)	Case study
Entrepreneurial orientation	A managerial attitude that will guide the entire strategy-making process following an	nine-item, seven-point scale proposed by Covin and Slevin (1989)	Alegre & Chiva (2013)	Case study

	entrepreneurial strategic posture			
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Passion and Self-Achievement. Passion and self-achievement allows entrepreneurs possess entrepreneurial passion towards their ventures [9, 18] and high self-achievement orientation. This dimension of entrepreneurial capability assists helps lay the foundation for devoting into new venture that reflect an individual’s belief of his/her own career and the capability to hold the view.

Integrity and Commitment. Integrity and commitment focus on keeping honesty and caring about others, having high social responsibilities, and possessing highly commitment towards careers. It accounts for complying with laws and social morality, caring about others, as well as having the spirit to dedication and working hard. This capability reflects the entrepreneur’s role as ethical leadership, which would in turn enhance employee’s perceived vision of the firm, and thus improve firm performance.

Leadership and Management. Enterprise management capability and leadership allows entrepreneurs could not only lead employees to reach goals, but also, aware and seize business opportunities [10, 19].

Active Learning and Analysis. Active learning, critical thinking, and logical analysis allow entrepreneurs to keep an open mind, and active explore and search new information, and seek and discover innovation [11], as well as make reasonable judgements based on critical analysis, both of them are essential to be a successful entrepreneur.

Study 1: item generation, reliability, dimensionality, and factor structure

This study aims to generate a scale for entrepreneurial capability, and test the reliability and discriminant validity of the scale, using both exploratory factor analysis and confirmatory factor analysis. Using both deductive and inductive approaches for item generation [20], we first generated 41 items to assess the entrepreneurship capability construct and to reflect the four dimensions theorized to comprise entrepreneurial capability.

Method

A survey was conducted to collect data from entrepreneurs across multiple industries in Beijing, China. The survey was drafted in English and translated into Chinese according to the back

translation guidance of Brislin [21]. Of the 600 surveys, 293 questionnaires were returned with complete data, reflecting a response rate of 48.9%. The detailed demographic statistical analysis was shown in Table 2.

Table 2
Demographic statistical analysis of Study 1 ($N=293$)

Variable	Value	Frequency	Percentage
Gender	Male	199	67.9
	Female	94	32.1
Age	Below 30	51	17.4
	30-40	125	42.7
	41-50	89	30.4
	51-60	26	8.8
	Above 60	2	.7
Abroad experience	Yes	50	17.1
	No	243	82.9
Work experience	Yes	250	85.3
	No	43	14.7
Entrepreneur experience	No	161	54.9
	Once	86	29.4
	Twice	34	11.6
	Three times	11	3.8
	Others	1	.3
Firm age	Less than 2 years	41	14.0
	2-5 years	92	31.4
	6-10 years	74	25.3
	More than 10 years	86	29.3
Period	Initial stage	69	23.6
	Growth stage	180	61.4
	Mature stage	44	15.0
Firm size	Less than 10 people	50	17.1
	10-20	41	14.0

21-100	106	36.2
101-300	52	17.7
More than 300	44	15.0

To explore and confirm the entrepreneurship scale, using SPSS 20.0, we first split the dataset randomly into 2 approximate equal datasets, using the first half of the sample (N=148) to conduct an exploratory factor analysis. Results showed that the Kaiser-Meyer-Olkin overall statistic was .95, much higher than the recommended .60 threshold. Meanwhile, the approximate chi-square of Bartlett's test of sphericity of 2395.37 (degree of freedom=435) was significant. Thus, the whole correlation matrix was appropriate for factor analysis. Our observations to respondent ratio for this analysis was 3.6:1, which does not exceed the 5:1 rule-of-thumb ration [22]. Then, using a principal components exploratory factor analysis with Promax rotation, 4 factors with eigenvalues greater than 1 were generated. Among them, 2 items (e.g., "You have clear self-assessment", and "You can learn actively") were eliminated due to failing to pass reliability analysis. Then, 1 item (e.g., "You can correctly communicate information using multiple methods") was eliminated due to its factor loading was less than .40, 7 items (e.g., "You can reflect through the lesson", "You can tolerate setbacks and failures at work", "You can actively maintain your work relationship networks", "You can actively maintain your work relationship networks", "You can reasonably allocate your firm's internal human, finance, and property resource", "You can make decisions quickly", and "You can consider problems in flexible thinking.") were eliminated due to lack of discriminate validity across different factors. Then, one item was eliminated due to fail to load on its intended factor (e.g., "You have a firm and indomitable perseverance").

The Promax rotated factor solution of the remained 30 items were shown in Table 3, indicating that these 4 factors explained 63.01% of the total variance. All items had positive loadings greater than .40 on their intended dimensions and there were no cross loadings, suggesting that the 4 factors are readily interpretable and represents the 4 dimensions of entrepreneurial capability. As also presented in Table 2, the high internal consistency indicators for each factor showed the reliability estimates of .93 for active learning and analysis, .86 for integrity and commitment, .93 for leadership

and management, and .76 for passion and self-achievement, the inter-correlations of the 4 dimensions ranged in magnitude from .43 to .73.

Table 3

Results of exploratory factor analysis for entrepreneurial capability (1st half sample of Study 1, N=148)

Items	Factor	Factor	Factor	Factor
	1	2	3	4
<i>Leadership and management</i>				
1. C23 You could aware, collect, and analyze market information acutely.	.86	.57	.33	.32
2. C22 You can always seize the business opportunity.	.84	.52	.26	.33
3. C24 You have core resources to seize the opportunity.	.82	.57	.28	.33
4. C21 You can aware the business opportunity of products and services which customers need.	.82	.56	.33	.37
5. C27 You can find right partners to establish the core team.	.76	.56	.49	.22
6. C28 You can lead your employees to reach goals.	.76	.53	.44	.09
7. C26 You can delegate duties and rights to subordinates reasonably.	.75	.53	.55	.12
8. C25 You can establish reasonable profit distribution mechanism to maintain your team.	.74	.50	.51	.22
9. C19 You can establish relationships with people or organizations that possess core resources.	.73	.47	.35	.26
10. C15 You can persuade others to agree with your views.	.68	.53	.42	.30
<i>Active learning and analysis</i>				
11. C34 You could learn through multiple methods.	.48	.85	.57	.19
12. C37 You can always bring out new ideas.	.68	.84	.37	.30
13. C38 You can think critically.	.65	.82	.36	.18
14. C33 You keep pay attention to the latest cutting-edge technology in your industry or related industries.	.58	.81	.49	.22
15. C31 You can put what you learn into practice.	.54	.79	.50	.20
16. C35 You could utilize your ideas/views into business.	.67	.79	.35	.36
17. C32 You have the consciousness of lifelong learning.	.45	.78	.60	.24
18. C36 You dare to take risks properly at work.	.48	.78	.34	.36
19. C40 You can analyze logically and comprehensively.	.67	.74	.41	.13
<i>Integrity and commitment</i>				
20. C5 You can insist integrity to others.	.27	.34	.81	.40
21. C8 You can comply with laws and social morality.	.40	.52	.76	.05
22. C7 You have social responsibilities.	.32	.37	.75	.42
23. C6 You care about others.	.33	.33	.75	.25
24. C11 You can make unremitting efforts for the development of the firm.	.49	.56	.69	.36
25. C13 You have the spirit to dedication and work hard.	.46	.53	.67	.22

26. C17 You can always respect others' views and actions in communication.	.52	.49	.66	.12
<i>Passion and self-achievement</i>				
27. C1 You are full of passion to entrepreneurship.	.26	.26	.14	.81
28. C2 You have strong desire for self-achievement.	.32	.29	.36	.76
29. C3 You are not satisfied with the status quo, willing to accept the challenge.	.37	.28	.45	.69
30. C4 You are full of confidence even in the face of adversity.	.37	.40	.50	.63
Eigenvalue	10.72	10.47	7.78	4.00
Percentage of variance explained	43.45	8.38	6.16	5.03
Cumulative percentage of variance explained	43.45	51.83	57.99	63.12
Coefficient alpha reliability estimates	.93	.93	.86	.76 ^a

^a Although the coefficient alpha of the 4th factor is smaller than the alphas of the other four factors, it exceeds the threshold of .70 [23] and thus could be accepted.

Results and Discussion

Confirmatory Factor Analysis of Each Variable, Correlation Analysis and Consistent

Reliability Analysis. Next, we conducted a confirmatory factor analysis on the items of each of the variables of the second half of the sample ($N=145$), using AMOS 21.0. The proposed 4-factor model was estimated to demonstrate that they empirically define distinct latent variables. Specifically, we put *active learning and analysis, integrity and commitment, leadership and management, and passion and self-achievement* into a 4-factor model (Model 1) and compared its fit with a one-factor model (Model 2). After admitting 31 pairs of correlations between error terms, the final results indicated that in terms of goodness-of-fit indices, the 4-factor model provided a superior fit to the data over each of the other models ($\chi^2/df=2.25<3$, $CFI=.92>.90$, $RMSEA=.07<.08$), and fit was significantly better ($\chi^2=834.06$, $df=370$, $p<.001$) than a one-factor model ($\chi^2/df=7.07$, $CFI=.89$, $RMSEA=.14$).

Test for common method bias. Then, we conducted several tests as below to alleviate the concern about common method bias: First, we took Harman's one-factor test by including all items in a principal components factor analysis [24]. As each factor explains roughly equal variance, without particularly differences in covariance, so that the data did not indicate evidence for common method bias. Second, we conducted a partial correlation. As Table 3 indicates, the correlation matrix does not indicate any highly correlated factors (the highest correlation $r=.73<.90$), which indicate no extremely high correlation exists between every factors, thus the concern of common method bias could be

alleviated to some degree. Meanwhile, Table 3 also indicates the discriminant validity of the four dimensions. We calculated the square root of the average variance explained by each of the four dimensions of entrepreneurial capability, following the procedure recommended by Fornell and Larcker [25]. The value present on the diagonal of Table 4, represents the variance accounted for by each items that compose the scale, and which must exceed the corresponding latent variable correlations in the same row and the same column to demonstrate discriminant validity, which means that the variance shared between any two dimensions is less than the average variance explained by the items that compose the dimension. As Table 4 indicates, the three dimensions of entrepreneurial capability are distinct from one another thus each of them measure unique aspects of entrepreneurial capability.

Table 4

Means, standard deviations, and zero-order inter-correlations (2nd half sample of Study 1, N=145)

Variable	Mean	S.D.	1	2	3	4
1. Active learning and analysis	4.34	.56	.95			
2. Integrity and commitment	4.63	.43	.63**	.89		
3. Leadership and management	4.17	.56	.73**	.58**	.92	
4. Passion and self-achievement	4.47	.52	.43**	.50**	.45**	.78

Note: 1. **p<0.01, two-tailed test. 2. Square root of the average variance explained appear on the diagonal, which must be larger than all zero-order correlations in the same row and column so that they appear to demonstrate discriminant validity [25].

Study 2 Nomological Validity and Moderation Effect

This study aims to further test the nomological validity of the entrepreneurial capability scale, by examining the effect of prior experience acting as antecedent, and new venture performance acting as consequence. Meanwhile, this study aims to test the moderating effect of entrepreneurship education on the relation between entrepreneurial capability and new venture performance.

Method

We conducted another survey using modified scale of entrepreneurial capability, adding measure of prior experience and new venture performance to further evaluate the nomological validity of the scale of entrepreneurial capability. The survey was conducted to collect data from entrepreneurs

across multiple industries in Wuhan, Xiamen, and Beijing in China. Of the 300 surveys, 113 questionnaires were returned with complete data, reflecting a response rate of 37.7%. The detailed demographic statistics as well as correlations between variables was shown in Table 2.

The 30 items for *entrepreneurial capability* from the first study was used. The results of exploratory factor analysis for the second survey showed consistency with the results of first study in sample adequacy test [22]. Results showed that the KMO overall statistic was .92, much higher than the recommended .60 threshold. Meanwhile, the approximate chi-square of Bartlett's test of sphericity of 2635.03 (degree of freedom=435) was significant. Thus, the whole correlation matrix was appropriate for factor analysis. Then, using a principal components exploratory factor analysis with Promax rotation, 4 factors with eigenvalues greater than 1 explained a cumulative 69.87% of total variance.

The scale for *new venture performance* ($\alpha=.91$) was composed of 13 items which loaded on 3 dimensions: *innovation performance*, *growth performance*, and *management performance*. *Innovation performance* ($\alpha=.86$) consisted of 4 dimensions: (1) The patents application number of my firm is higher than competitors; (2) The new product release number of my firm is higher than competitors; (3) The development speed of new product of my firm is faster than competitors; and (4) The proportion of new products sales in total sales is higher than competitors. *Growth performance* ($\alpha=.85$) was composed of 5 dimensions: (1) The profit rate of my firm is higher than competitors; (2) The growth of product sales of my firm is faster than competitors; (3) The growth rate of market value of my firm is faster than competitors; (4) The growth rate of market share of my firm is faster than competitors; and (5) Our firm is satisfactory with growth of performance. *Management performance* ($\alpha=.81$) was composed of 4 dimension: (1) The customer satisfaction of our firm is higher than last year; (2) We accept and implement more employee advice than last year; (3) Employee capabilities are highly improved than last year; and (4) Just a few of employees hold the view of turnover. Each item of new venture performance was rated on a 5-point Likert scales (1-totally disagree; 2-basically disagree; 3-not sure; 4-basically agree; and 5-totally agree). The scale for *prior experience* ($\alpha=.70$) was composed of 7 items following: (1) Specific knowledge about the industry; (2) Multidisciplinary foundation; (3) Technology and R&D experience; (4) Marketing experience; (5) Accounting

experience; (6) Manufacturing experience; and (7) General management experience.

A total of 9 control variables were included. *Firm size* was measured by number of current employees in the firm, and was divided into 5 categories: (1) below 10 employees; (2) 10-200 employees; (3) 21-100 employees; (4) 101-300 employees; and (5) above 300 employees. *Industry* type was measured with China Industrial Classification and Codes for National Economic Activities (GB/T4754-2011). Originally 12 categories of industries were included in the survey. Gender was measured with a dummy variable (0=female, 1=male). *Age* was measured with 5 categories: (1) <30; (2) 30-40; (3) 41-50; (4) 51-60; and (5) >60. *Major* type was measured with 5 categories: (1) Science department; (2) Engineering department; (3) Economics & Management department; (4) Humanities department; and (5) Others. *Major relation* referred to the degree of relatedness between the entrepreneur's major in university and the industry of the firm, and was coded as "1" for "consistent"; "2" for "related"; and "3" for "unrelated". *Education* was coded as "1" for "less than college degree"; "2" for "4-year college graduate"; "3" for "Master degree"; "4" for "Ph.D. degree"; and "5" for "others". *Abroad* referred to whether the entrepreneur had abroad learning, training, or living experience, and was coded with a dummy variable (1=yes, 2=no). *Entrepreneurial experience* referred to serial entrepreneurs who have entrepreneurship experience before they start the existing new venture. This variable was measured with categories: (1) No entrepreneurial experience; (2) once; (3) twice; (4) triple times; and (5) others.

To measure the moderating effect of *entrepreneurship education*, participated entrepreneurs were asked to answer whether they have received or participated in entrepreneurship education (e.g., entrepreneurship competition or lecture, entrepreneurial guidance) in universities (1=yes, 0=no).

Here we propose hypotheses as below:

Hypothesis 1: Each of the four dimensions of entrepreneurial capability is positively related to new venture's three dimensions of performance.

Hypothesis 2: Prior experience is positively related to each of the four dimensions of entrepreneurial capability.

Hypothesis 3: Entrepreneurship education positively moderates the relation between entrepreneurial capability and new venture performance: to entrepreneurs who received

entrepreneurship education, the positive effect of their entrepreneurial capability on new venture performance is greater than to those who did not receive entrepreneurship education.

Results and Discussion

Initial analyses. Basic statistics includes means, standard deviations, and Pearson's correlations among all variables were shown in Table 5.

Pearson's correlations among all variables was reported in Table 4. Entrepreneurial capability was significantly positively correlated with prior experience, and new venture performance as expected. The correlations among the four dimensions of entrepreneurial capability (passion, integrity, management, and learning) ranged from $r=.53$ to $r=.84$. The correlations among the three dimensions of new venture performance (growth performance, innovation performance, and management performance) ranged from $r=.50$ to $r=.62$. Therefore, we added two analysis separately for entrepreneurial capability, and new venture performance, to ensure discriminant validity among their dimensions. First, for entrepreneurial capability, we compared a 4-factor measurement model with 1-factor model. Results show that the 4-factor model fit the data (CFI=.93, RMSEA=.07, $\chi^2/df=1.54$) while the one factor model did not (CFI=.70, RMSEA=.13, $\chi^2/df=2.95$). For new venture performance, we compared a 3-factor measurement with 1-factor model. Results show that the 3-factor model fit the data (CFI=.97, NFI=.91, RMSEA=.07, $\chi^2/df=1.52$) while the one factor model did not (CFI=.72, NFI=.67, RMSEA=.17, $\chi^2/df=4.36$).second, following procedure recommended by [25], we calculated the square root of average variance explained for each of the four dimensions of entrepreneurial capability, and the square root of average variance explained for each of the three dimensions of new venture performance. For entrepreneurial capability, the values for each of the four dimensions are greater than the correlations among the scale dimensions. For new venture performance, the values for each of the three dimensions are also greater than the correlations among the scale dimensions.

Table 5Means, standard deviations, and correlations (Study 2, $N=113$).

Note: Two-tailed test. GP=growth performance IP=innovation performance MP=management performance

Variable	Mean	S.D.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. Firm size	2.05	1.17																
2. Industry	4.67	4.66	-.02															
3. Gender	.83	.39	-.06	-.09														
4. Age	1.91	.90	.45**	-.12	.22*													
5. Major	2.29	1.01	.14	.18	-.13	-.00												
6. Major relation	2.00	1.01	.12	.10	.03	-.10	.31**											
7. Education	2.46	.88	-.29**	-.14	.12	.02	-.23*	-.39**										
8. Abroad	1.80	.40	.10	-.01	-.02	-.28**	.19*	.26**	-.35**									
9. Entre exp	1.70	.92	.08	-.06	.11	.14	.14	.07	-.03	.06								
10. Prior experience	3.07	.57	-.10	-.20*	-.26**	.14	-.35**	-.12	.34**	-.26**	.16							
11. Passion	4.54	.62	.00	-.07	-.19*	.10	-.06	.05	.20*	-.05	-.07	.28**						
12. Integrity	4.52	.52	.07	-.12	-.14	.16	.07	.10	.16	-.13	-.07	.22*	.66**					
13. Management	4.10	.65	.05	-.06	-.09	.10	.05	.03	.21*	-.18	.04	.31**	.53**	.66**				
14. Learning	4.26	.68	.01	-.21*	-.17	.14	-.04	.03	.33**	-.21*	.06	.35**	.54**	.72**	.84**			
15. GP	3.37	.66	.14	-.10	.05	.10	.05	-.11	.18	-.07	-.04	.13	.25**	.15	.38**	.33**		
16. IP	3.38	.77	.15	-.12	.02	.17	.04	-.12	.18	-.10	-.01	.14	.24**	.13	.29**	.27**	.61**	
17. MP	3.83	.62	.10	-.12	.06	.06	.03	-.00	.22*	-.06	.08	.23*	.23*	.27**	.45**	.42**	.62**	.50**

* $p < .05$, ** $p < .01$.

Then, to ensure the independence of the antecedents and consequences of entrepreneurial capability, using structural equation modelling, we began with a 1-factor model where all of items for the 8 scale (passion, integrity, management, learning, prior experience, growth performance, innovation performance, and management performance) were loaded on 1 factor. While this model cannot be converged to identification. Then, we estimated an 8-factor model with one factor representing each of our variables, and suggested that prior experience act as antecedents of four dimensions of entrepreneurial capability (passion, integrity, management, and learning), and three dimensions of new venture performance (growth performance, innovation performance, and management performance) act as consequences of entrepreneurial capability. The 8-factor model could fit the data ($CFI=.85$, $RMSEA=.07$, $\chi^2/df=1.56$).

Hypothesis testing. Results of hypothesis 1 testing as well as nomological validity between entrepreneurial capability and its antecedents are presented in Table 6. As Model 1, 5, and 7 shows, education significantly related to passion, management, and learning. Hypothesis 1 predicts that prior experience is significantly related to each dimensions of entrepreneurial capability. As expected, the effect of prior experience on passion, management, and learning was positive and significant (Model 2, 6, and 8). However, the effect of prior experience on integrity was not significant (Model 4).

Hierarchical F-tests confirmed that for passion, management, and learning, the predictive power was significantly stronger after entering prior experience into the model. Thus, Hypothesis 1 was partially supported.

Table 6

Results of regression analysis for the antecedents of entrepreneurial capability (Study 2, $N=113$)

Variable	Active learning and analysis		Integrity and commitment		Leadership and management		Passion and self-achievement	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Control								
Firm size	.08	.09	.07	.07	.11	.12	.03	.04
Industry	-.16	-.14	-.11	-.09	-.04	-.01	-.01	.01
Gender	-.12	-.08	-.13	-.10	-.10	-.04	-.16	-.12
Age	.03	.02	.10	.09	-.01	-.03	.09	.08
Major	.05	.11	.11	.17	.11	.20	-.02	.05
Major relation	.19	.17	.19	.17	.12	.09	.16	.14
Education	.35**	.29**	.21	.17	.24*	.16	.25*	.20
Abroad	-.15	-.12	-.10	-.07	-.17	-.12	.02	.06
Entre exp	.03	-.01	-.13	-.16	.02	-.03	-.11	-.15
Prior experience		.24*		.20		.31**		.25*
R^2	.21	.25	.14	.16	.10	.17	.11	.15
Adjusted R^2	.14	.18	.06	.08	.03	.09	.03	.07
ΔR^2	.21	.25	.14	.16	.10	.17	.11	.15
ΔF	3.00**	3.40**	1.78	1.97*	1.32	2.10*	1.40	1.81†

Note: † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$. Standardized coefficients are reported.

Results of Hypothesis 2 testing as well as nomological validity between entrepreneurial capability and its consequences are presented in Table 7-Table 9. Hypothesis 2 predicts that the 4 entrepreneurial capability dimensions are positively related to new venture performance. Table 7 reports the effect of entrepreneurial capability on growth performance, and the moderating effect of entrepreneurship education on above relation. As expected, passion (Model 2), leadership and management capability (Model 4), and learning capability (Model 5) all have positive effect on growth performance. But integrity and commitment (Model 3) does not have significant effect on growth performance. Hierarchical F-tests confirmed that for above significant relations, the predictive

power was significantly stronger after corresponding entrepreneurial capability was entered. Thus, Hypothesis 2 was partially supported. We used 2-step regression analysis by entering latent variable's Anderson & Rubin factor score [26] into regression to examine entrepreneurship education's hypothesized moderating effect. With a bootstrapping approach (drawing on 500 random samples), based on findings that distributional assumptions would always not be supported in small samples [27]. However, the moderating role of entrepreneurship education in the relation between any dimensions of entrepreneurial capability and growth performance is not significant (Model 6-Model 9). Table 8 reports the effect of entrepreneurial capability on innovation performance, and the moderating effect of entrepreneurship education on above relation. As expected, passion (Model 2), leadership and management capability (Model 4), and learning capability (Model 5) all have positive effect on innovation performance. But integrity and commitment (Model 3) does not have significant effect on innovation performance. Hierarchical F-tests confirmed that for above significant relations, the predictive power was significantly stronger after corresponding entrepreneurial capability was entered. Thus, Hypothesis 2 was partially supported. However, the moderating role of entrepreneurship education in the relation between any dimensions of entrepreneurial capability and innovation performance is not significant (Model 6-Model 9).

Table 7

Results of regression analysis for Growth performance (Study 2, $N=113$)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Control									
Firm size	.19	.06	.18	.15	.16	.19†	.18	.15	.17
Industry	-.08	.01	-.07	-.07	-.03	-.08	-.09	-.08	-.04
Gender	.04	.17	.06	.08	.08	.08	.07	.08	.07
Age	.01	.08	-.00	.01	.00	.02	.05	.03	.01
Major	.11	.07	.10	.07	.09	.09	.09	.07	.08
Major relation	-.08	.10	-.10	-.12	-.14	-.10	-.08	-.11	-.13
Education	.21	.08	.19	.13	.10	.13	.19	.13	.09
Abroad	-.01	.18	.01	.06	.04	.01	.02	.06	.05
Entre exp	-.05	.07	-.03	-.05	-.06	-.01	-.02	-.05	-.07
Passion		.24*				.30**			
Integrity			.11				.15		
Management				.36***				.38**	

Learning					.32**				.30*
Entre education						1.36	1.24	.24	-.11
Passion*Entre edu						-1.31			
Integrity*Entre edu							-1.16		
Management*Entre edu								-21	
Learning*Entre edu									.18
R ²	.09	.14	.10	.21	.17	.16	.12	.16	.18
Adjusted R ²	.01	.06	.01	.13	.09	.06	.02	.06	.08
ΔR ²	.09	.14	.10	.21	.17	.16	.12	.16	.18
ΔF	1.15	1.68†	1.15	2.69**	2.14*	1.63†	1.15	1.54	1.80†

Note: † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$. Standardized coefficients are reported. Results are based on 500 bootstrap samples.

Table 8

Results of regression analysis for Innovation performance (Study 2, N=113)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Control									
Firm size	.16	.15	.16	.13	.14	.16	.15	.13	.14
Industry	-.10	-.10	-.10	-.09	-.06	-.08	-.09	-.08	-.05
Gender	.03	.07	.04	.05	.06	.08	.06	.06	.05
Age	.08	.06	.08	.09	.08	.07	.11	.08	.07
Major	.10	.10	.10	.07	.09	.11	.11	.08	.09
Major relation	-.07	-.10	-.08	-.10	-.11	-.11	-.08	-.10	-.12
Education	.20	.14	.19	.14	.12	.14	.21	.15	.12
Abroad	-.02	-.02	-.01	.03	.02	-.02	.01	.03	.02
Entre exp	-.03	.01	-.02	-.04	-.38	.00	-.00	-.04	-.05
Passion		.22*				.28*			
Integrity			.07				.15		
Management				.25**				.26*	
Learning					.23*				.21†
Entre education						.75	1.38	-.05	-.30
Passion*Entre edu						-.81			
Integrity*Entre edu							-1.40		
Management*Entre edu								.01	
Learning*Entre edu									.28
R ²	.10	.14	.10	.16	.14	.15	.12	.12	.14
Adjusted R ²	.02	.06	.01	.07	.06	.05	.01	.02	.04
ΔR ²	.10	.14	.10	.16	.14	.15	.12	.12	.14

ΔF	1.24	1.68†	1.16	1.87†	1.66	1.47	1.13	1.15	1.38
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Note: † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$. Standardized coefficients are reported. Results are based on 500 bootstrap samples.

Table 9 reports the effect of entrepreneurial capability on management performance, and the moderating effect of entrepreneurship education on above relation. As expected, passion (Model 2), integrity and commitment (Model 3), leadership and management capability (Model 4), and learning capability (Model 5) all have positive effect on innovation performance. Hierarchical F-tests confirmed that for above significant relations, the predictive power was significantly stronger after corresponding entrepreneurial capability was entered. Thus, Hypothesis 2 was supported. Meanwhile, entrepreneurship education has positive moderating effect on the relation between management capability and management performance (Model 8), and on the relation between learning capability and management performance (Model 9), but the moderating effect of entrepreneurship education is not significant for passion (Model 6) and integrity (Model 7). Hierarchical F-tests confirmed that for above significant relations, the predictive power was significantly stronger after interaction between corresponding entrepreneurial capability and entrepreneurship education was entered. Thus, Hypothesis 3 was partially supported.

Table 9

Results of regression analysis for management performance (Study 2, $N=113$)

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9
Control									
Firm size	.16	.16	.15	.12	.13	.16	.15	.16	.14
Industry	-.10	-.10	-.08	-.09	-.04	-.11	-.10	-.09	-.04
Gender	.11	.14	.14	.14	.15	.13	.13	.10	.11
Age	-.01	-.03	-.04	-.01	-.03	-.00	-.01	-.04	-.04
Major	.05	.05	.02	-.00	.03	.03	.00	-.04	-.01
Major relation	.09	.06	.04	.04	.01	.08	.06	.06	.02
Education	.31**	.26	.26	.21	.17	.24*	.25*	.18†	.12
Abroad	.01	.00	.03	.08	.07	.01	.04	.07	.06
Entre exp	.07	.10	.10	.07	.06	.10	.10	.02	.01
Passion		.21*				.21†			
Integrity			.24*				.23*		

Management				.42***				.26*	
Learning					.40***				.25*
Entre education						.59	.28	-1.16*	1.23*
Passion*Entr e edu									-0.50
Integrity*Ent re edu									-0.18
Management *Entre edu									1.28*
Learning*Ent re edu									1.35*
R^2	.11	.15	.16	.27	.23	.16	.17	.30	.28
Adjusted R^2	.03	.06	.08	.20	.16	.06	.07	.22	.19
ΔR^2	.11	.15	.16	.27	.23	.16	.17	.30	.28
ΔF	1.40	1.76†	1.92†	3.76***	3.12**	1.55	1.67†	3.62***	3.18**

Note: † $p < .1$, * $p < .05$, ** $p < .01$, *** $p < .001$. Standardized coefficients are reported. Results are based on 500 bootstrap samples.

Summary and Concluding Discussion

Key findings and contributions

Our study makes several important contributions to entrepreneurial capability research. First, we summarize and redefine entrepreneurial capability, by specifically proposing that entrepreneurial capability consisting of four dimensions: (1) the capability of active learning, critical thinking and logical analysis; (2) the capability of keeping integrity towards others and towards the society, and commitment to the career; (3) the capability of enterprise management, and possessing business sense and leadership; and (4) the capability of possessing passion towards entrepreneurship and high self-achievement.

Second, we answered the call for improved entrepreneurial capability construct development and measurement by developing and validating a theoretically justified measure for entrepreneurial capability. Our scale was found to reflect solid psychometric properties as indicated by the confirming evidence across two different samples. The items retained after two rounds of validation test indicated strong internal reliability. Study 2 propose that prior experience significantly predicted all four dimensions of entrepreneurial capability. This finding corresponds with previous research. Meanwhile, the nomological model tested in Study 2 contributes to current understanding of the relationship

between entrepreneurial capability and new venture performance.

Third, we offered a measurement of capability on the individual-level instead of firm-level. Previous researches focused on firm-level entrepreneurial capability has seldom empirically supportive evidences mainly due to the difficulty to measure the whole firm's entrepreneurial capability, and the lack of validity. This study provide a new aspect to study entrepreneurial capability. We also contribute to entrepreneur's characteristics literature, by developing and testing that entrepreneurial capability as one type of individual characteristic and its role in firm performance.

Finally, we discovered that receiving/participating in entrepreneurship education in universities positively moderates the relation between management capability, learning capability and new venture's management performance. For entrepreneurs who have received entrepreneurship education, the positive effect of their leadership and management capability, and active learning and analysis capability on their new venture's management performance is stronger than entrepreneurs who did not receive entrepreneurship education.

Limitations and strengths

Since Study 2 was based on entrepreneurs' self-reported new venture performance, as well as self-reported entrepreneurial capability, common method biases cannot be ignored. However, we have tested this issue adapting Harman's one-factor test and partial correlation method [24]. Although our results indicate that common method bias was not a major concern in this study, this measurement issue should also be prevented in future research.

This study has several notable strengths. First, the re-conceptualization and operationalization of entrepreneurial capability presented in this paper builds on current work, integrating previous researches and offering new sights into the four dimensions of entrepreneurial capability.

Conclusions and implications for future research

We used two sequential iterative studies to develop and validate the scale of entrepreneurial capability, and tested its influences on new venture performance. Besides, our findings that prior experience act as antecedents of entrepreneurial capability as well as the moderating effect of entrepreneurship education could stimulate further researches about

entrepreneurship education, as well as entrepreneurship policy making to build universities which simultaneously perform well in research, teaching, and, increasing importantly, in fostering entrepreneurship. Since entrepreneurial capability plays a major role in new venture performance, and could be affected by entrepreneurs' prior experience, it is reasonable that such entrepreneurial capability could be learned or fostered by subjective efforts. With the development of this new entrepreneurial capability scale, future research could further investigate which type of entrepreneurial capability could easily be learned through university education, which has far-reaching implications especially to building entrepreneurial universities.

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