Research on Innovative Practical Ability of Management Graduate Students Driven by Academic Competitions

Dan Liu[1] Jiameng Hou[2] Qinghua Li[3] Jilu Liu[4]

[1,2,3,4] *School of Business and Management, Jilin University, Changchun, Jilin 130022, China*
[1]*Corresponding author. Email: liu_dan@jlu.edu.cn*

ABSTRACT
This article constructs an evaluation index for the innovative practical ability of management graduate students, conducts a questionnaire survey on the master's and doctoral students at Jilin University, uses the entropy method to comprehensively evaluate their innovative practical ability, and conducts factor detection analysis on the impact of academic competitions on innovative practical ability through the geographic detector model. The results show that the core factors that have the greatest impact on the innovative practical ability of management graduate students in academic competitions are: the number of participants in academic competitions, the workload undertaken in academic competitions, the work responsible in academic competitions, and the number of times mentors guide them. The interaction type between any two driving factors is a two-factor enhancement relationship.

Keywords: *Academic competitions, Innovative practical ability, Management graduate students, Geographic detector model.*

1. INTRODUCTION

With the expansion of China's graduate enrolment scale, cultivating high-quality talents with solid professional knowledge and skills, as well as innovative abilities, is an inevitable requirement for high-level talents [1]. There is a need for mutual development and promotion among knowledge, skills, and innovation abilities to enhance the quality of graduate education [2]. In graduate education, academic competitions are an important way to cultivate graduate students' innovative practical ability, which is conducive to the organic combination of knowledge cultivation and skill training. Practical activities in academic competitions can promote the integration of professional knowledge and skills, laying a solid foundation for graduate students to carry out research and innovation work. Participating in academic competitions can stimulate graduate students' innovative consciousness, train innovative thinking, enhance innovation ability, and is a good way to cultivate their comprehensive quality.

2. LITERATURE REVIEW

Scholars have conducted beneficial explorations on the driving role of academic competitions on innovative practical abilities, laying a certain research foundation and obtaining fundamental empirical evidence.

Xiao et al. (2021) conducted empirical research on the external influencing factors of graduate students' innovation ability by constructing a structural equation model. The results indicated that mentor guidance and academic activities were key influencing factors in enhancing graduate students' research and innovation abilities [3].

Wang (2021) explored the current situation of graduate innovative practical competitions and their impact on the cultivation of graduate innovation ability. By constructing a regression model, it was found that the characteristics of competition questions were the main factors affecting the cultivation of graduate students' innovation ability [4].

Xing and Li (2022) constructed an evaluation model and related indicators for graduate students' innovative ability from the perspective of academic competitions and research project integration, collected data to verify the impact of academic competitions and research project integration on graduate students' innovative ability and the promotion relationship between them [5].

Liang and Wu (2023) proposed an integrated talent cultivation strategy and path of "learning, research, and competition" based on professional basic knowledge, scientific research and academic competitions, formed an innovative talent cultivation model driven by "scientific research projects + academic competitions" [6].

Research has found that there are still problems in current graduate education, such as excessive theorization, poor practicality, and lack of scientific research ability, etc. Chinese college graduates still face problems such as insufficient innovation awareness, low innovation ability, and lack of entrepreneurial willingness, which seriously restrict the cultivation of graduate students' innovation ability. Therefore, based on the evaluation results of innovative practical ability of management graduate students, this article uses a geographic detector model to explore the driving mechanism of academic competitions on management graduate students' innovative practical ability, in order to provide a new perspective for later scholars.

3. RESEARCH DESIGN

3.1 Design of Index System for Innovative Practical Ability

The comprehensive index system for innovative practical ability constructed in this article consists of four subsystems: innovative personality, learning ability, innovative achievements, and practical ability [7], as shown in “Table 1”.

Table 1. Evaluation index system for management graduate students‘ innovative practical ability

First level index	Second level index	Indicator attribute
Innovative personality	Openness	Qualitative
	Critical thinking	Qualitative
	Hardiness	Qualitative
	Collaboration and communication skills	Qualitative
Learning ability	Professional performance ranking	Quantitative
	Self-directed learning competence	Qualitative
	Number of scholarships awarded	Quantitative
Innovative achievements	Number of papers published	Quantitative
	Number of patents obtained	Quantitative
	Number of awards in academic competitions	Quantitative
Practical ability	Applied for graduate research projects	Qualitative
	Participated in mentor research projects	Qualitative
	Data analysis and processing capabilities	Qualitative

3.2 Selection of Driving Factors

The indicators reflecting academic competitions mainly include the number of academic competitions participated, the level of academic competitions participated, the workload undertaken in academic competitions, the work responsible in academic competitions, the frequency of participation in academic competition discussion meetings, the willingness to participate in academic competitions, the methods of mentor guidance, the frequency of mentor guidance, and the correlation between academic competitions and majors.

Then stratify the independent variables and classify each influencing factor as shown in “Table 2”.

Table 2. Evaluation index system for management graduate students' innovative practical ability

Influence factors	Measure standard	Grade	Indicator code
Number of academic competitions participated	0, 1, 2, 3, 4	5	X1
Level of academic competitions participated	National level, province level, City level, School level and below	4	X2
Workload undertaken in academic competitions	20% or less, 21%~40%, 41%~60% , 61% or more	4	X3
Work responsible in academic competitions	Very light, light, moderate, heavy, very heavy	5	X4
Frequency of participation in academic competition discussion meetings	1-4, 5-10,11-15,16-20, 20 or more times per month	5	X5
Willingness to participate in academic competitions	Active participation, teacher assignment, forced by pressure	3	X6
Methods of mentor guidance	Meet the mentor individually, meet the mentor with other classmates, guidance by Email/QQ/SMS/WeChat/Call	3	X7
Frequency of mentor guidance	Once a week or more, once a month or more, once or more per semester, less than once per semester	4	X8
Correlation between academic competitions and majors	Nothing, slightly related, closely related	3	X9

3.3 Data Sources

The official investigation took place from August to October 2024. According to the indicators set in "Table 1" and "Table 2", a total of 126 questionnaires were distributed to management master's and doctoral students at Jilin University, of which 118 were valid. The effective response rate is 93.65%. The main reason for invalid questionnaires is the lack of coordination in answering homogeneous and mutually exclusive questions. Qualitative indicators are set according to the Likert 5-point scale.

3.4 Research Method

Geographical Detector Model is a spatial analysis model used to detect the relationship between a certain geographical attribute and its explanatory factors. It is a statistical method based on spatial statistics and spatial autocorrelation theory, which can explore spatial differentiation, reveal the influence magnitude and significance level of each driving factor, and detect the strength of the interaction between factors [8]. This article uses the geographic detector model to explore the impact of academic competitions on the innovative practical ability of management graduate students through factor detection and interactive detection.

4. EMPIRICAL ANALYSIS

4.1 Factor Detection Results

The factor detection results (see "Table 3") indicate that all 9 factors in academic competitions have an impact on the innovative practical ability of management graduate students.

Table 3. Factor detection results of innovative practical ability for management graduate students

Detection factors	X1	X2	X3	X4	X5	X6	X7	X8	X9
q statistic	0.811	0.358	0.856	0.807	0.507	0.478	0.435	0.776	0.628
p value	0.000	0.004	0.000	0.000	0.000	0.001	0.000	0.000	0.000

a Note: All influencing factors passed the significance test with $p<0.05$.

Sorted by explanatory power as follows: X3 > X1 > X4 > X8 > X9 > X5 > X6 > X7 > X2.

The explanatory power of workload undertaken in academic competitions is 0.856. Graduate

students' in-depth participation in academic competitions can accumulate valuable practical experience, cultivate personal qualities such as patience, perseverance, and sense of responsibility, and enable them to better integrate into the innovation environment, engage in sufficient communication and cooperation with team members. These qualities are crucial for innovation.

The explanatory power of number of academic competitions participated is 0.811. The more academic competitions graduate students participate in, the more they can learn and master the forefront of their discipline, gain a deeper understanding of the knowledge they have learned, build a complete knowledge system, and improve their problem-solving abilities.

The explanatory power of work responsible in academic competitions is 0.807. Academic competitions involve topic selection, framework design, content determination, report writing, and presentation, etc. All of them test the ability of graduate students to think independently, form critical thinking and innovative thinking.

The explanatory power of frequency of mentor guidance is 0.776. Mentor guidance helps graduate students acquire new knowledge, master new methods and technologies, especially high-quality guidance can stimulate their innovative thinking and cultivate their ability to solve complex problems.

4.2 Interaction Factor Detection Results

This article uses the interactive detection method to detect the interactive effects of different factors on the innovative practical ability of management graduate students. The interaction results of 9 factors are shown in “Table 4”.

Table 4. Interaction factor score

	X1	X2	X3	X4	X5	X6	X7	X8	X9
X1	0.759								
X2	0.822	0.477							
X3	0.796	0.703	0.811						
X4	0.773	0.606	0.886	0.733					
X5	0.728	0.562	0.842	0.736	0.552				
X6	0.768	0.551	0.826	0.748	0.614	0.358			
X7	0.857	0.489	0.833	0.731	0.659	0.386	0.538		
X8	0.803	0.518	0.869	0.848	0.580	0.457	0.627	0.643	
X9	0.788	0.686	0.815	0.751	0.716	0.424	0.762	0.672	0.589

According to “Table 4”, after interaction detection among the 9 independent variables, a double factor enhancement phenomenon was observed, indicating a significant increase in factor explanatory power after bivariate interaction. From this, it can be seen that the influence of any two independent variables after interaction has stronger explanatory power than the original individual factors, indicating that the innovative practical ability of management graduate students is actually jointly influenced by multiple factors.

The results of interaction factor detection indicate that, combined with other factors, the number of academic competitions participated, the workload undertaken in academic competitions, and the work responsible in academic competitions, are the most significant influencing factors on graduate students' innovative practical ability. Based on the above factor detection results, it can be concluded that the number of academic competitions participated, the workload undertaken in academic competitions, and the work responsible in academic competitions are three important driving factors that affect the innovative practical ability of management graduate students.

5. CONCLUSION

This article constructs an evaluation index system for the innovative practical ability of management graduate students, and conducts a questionnaire survey on the innovative practical ability and academic competitions index system of management graduate students at Jilin University. The entropy method is used to comprehensively

evaluate the innovative practical ability, and the geographic detector model is used to detect the influencing factors.

The factor detection results indicate that the ranking of the explanatory power of academic competitions factors on innovative practical ability is: Workload undertaken in academic competitions > Number of academic competitions participated > Work responsible in academic competitions > Frequency of mentor guidance > Correlation between academic competitions and majors > Frequency of participation in academic competition discussion meetings > Willingness to participate in academic competitions > Methods of mentor guidance > Level of academic competitions participated.

The interaction detection results indicate that under the influence of three main factors, namely the number of academic competitions participated, the workload undertaken in academic competitions, and the work responsible in academic competitions, their interaction with the vast majority of driving factors will have a certain degree of impact on the innovative practical ability of management graduate students. The interaction type between any two driving factors mentioned in this article is a two-factor enhancement relationship.

AUTHORS' CONTRIBUTIONS

Dan Liu wrote the manuscript, Jiameng Hou was responsible for survey questionnaire design, Qinghua Li and Jilu Liu were responsible for questionnaire collection and data analysis.

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