

An Empirical Study on Cross-Border E-Commerce Talent Cultivation Based on Skill Gap Theory and Big Data Analysis

Jingzhi Zheng, Hubei University of Science and Technology, China*

Qixuan Shi, Hubei University of Science and Technology, China

ABSTRACT

To solve the dilemma between the increasing demand for cross-border e-commerce talents and incompatible student skill levels, industry-university-research cooperation, as an essential pillar for inter-disciplinary talent cultivation model adopted by colleges and universities, brings out the synergy from relevant parties and builds the bridge between the knowledge and practice. Nevertheless, industry-university-research cooperation has been developed only recently in the cross-border e-commerce field with several problems such as unstable collaboration relationships and vague training plans.

KEYWORDS

Competency Model, Cross-Border E-Commerce Talent Cultivation, Industry-University-Research Economic Management Ecosystem, Skill Gap

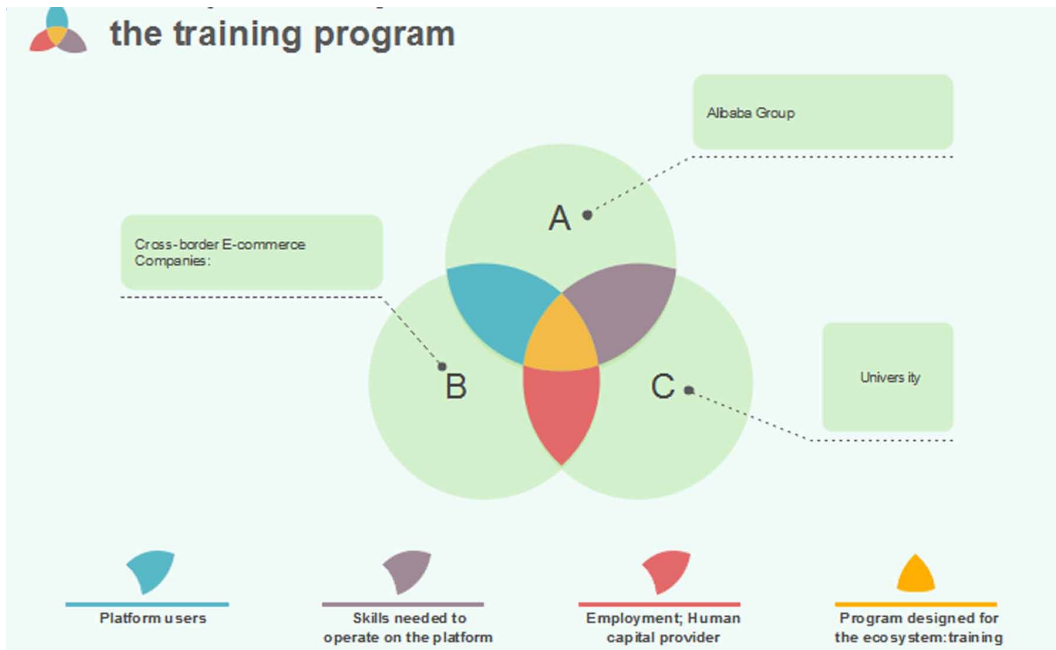
1. INTRODUCTION

1.1 Research Background

Cross-border E-commerce in China moved into a new direction with small and medium enterprises as its main body, emerging market in Southeast Asia, and digitalized transaction process (Alibaba SME International Trade Department & Ali Research, 2018). Students who want to pursue their careers in this arena must improve their skills in cross-border e-commerce platform operation and management, international logistics management, and the ability to capture the dynamic market changes (Zhang, 2017). Nevertheless, the further development of the industry was hindered by the three main problems: the shortage of proper employees, the rising human resource expenses, and the gap between the market requirements and traditional education models. To narrow the gap, the program, "one hundred cities, one thousand schools, ten thousand e-commerce talents," led by Alibaba, government, companies, training agencies, and universities, is devoted to helping fresh graduates improve their skills and employment rate. This form of collaboration is the symbol of the business ecosystem and the industry-university-research ecosystem development.

The collaboration with the third parties allows Alibaba groups to improve their performance and gather the partners that share the same vision with it (Yang, 2017). Similarly, eBay established its first "E young" program in Jiangsu college of technology and engineering to support the cross-border e-commerce companies in finding proper cross-border e-commerce talents in the universities. All the tentative exploration in the cross-border e-commerce talent training provides the research substantial

Figure 1. The operation system of the training program



cases to study. Moreover, it gives the possibility of building a systematic industry-university-research cooperation ecosystem for this industry.

At present, the collaboration between the universities and companies is often built on a weak linkage, which dangers the stability of the long-term relationship between both parties. Also, there is a lack of the mechanism to guarantee students' skills and narrow the gap between the students' abilities and required abilities. Moreover, through comparing the revenue of Alibaba and Amazon, we could find that the cross-border e-commerce industry in China remains to be developed as the portion of international commerce still takes a small amount of the total revenue. This situation results from stagnant industrial development as well as the shortage of talent. As human capital is the foundation of the booming cross-border e-commerce industry, it is vital to find out how to narrow the skill gaps between students and talents that could fulfill the market requirements.

Many studies have developed cooperation modes from the perspectives of universities or enterprises. However, most research is concentrated on universities' interests in cooperation while forgetting the concerns from companies towards cooperation. This research will provide a systematic analysis of the cooperation model and students' present skill levels to develop a sustainable development model.

1.2 Research Purpose

The traditional cross-border e-commerce companies are at the turning point to change their business model. There are two gaps in the job market. One is the gap between the students' seeking jobs related to cross-border e-commerce but found they could not fill the requirements for the job. The other is the gap between the needs of many traditional e-commerce companies eager to get cross-border e-commerce talents to transform their business model (Zou, 2016). Many previous studies have worked on the need analysis of cross-border e-commerce companies and the methods of talent cultivation. Those studies have laid a solid foundation for the subsequent investigations, but most of them focused on one side and compared the requirements directly with the cultivation system to

Figure 2. Alibaba e-commerce revenue from 2010 to 2018

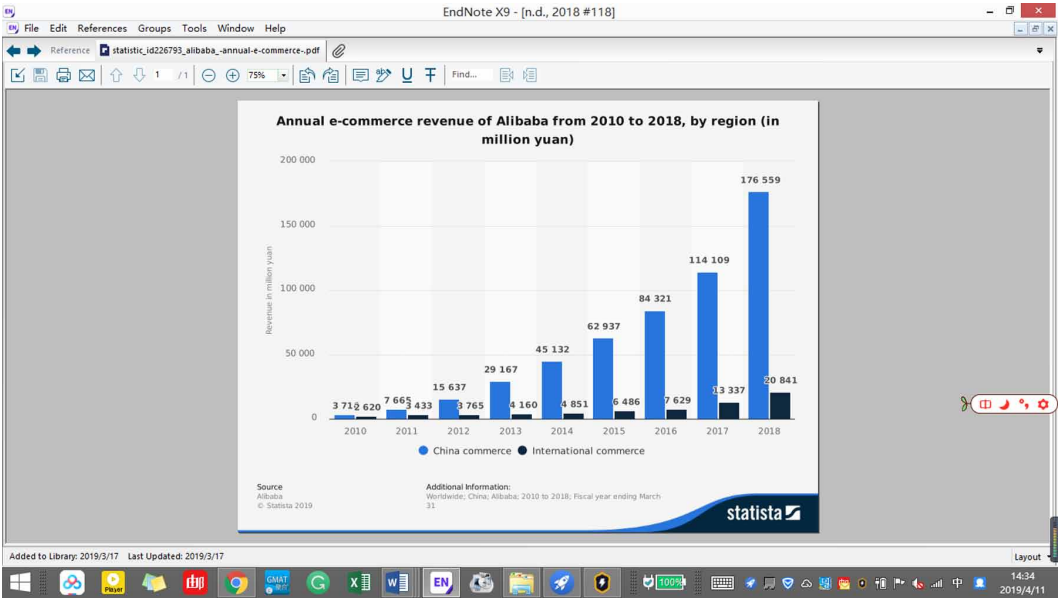
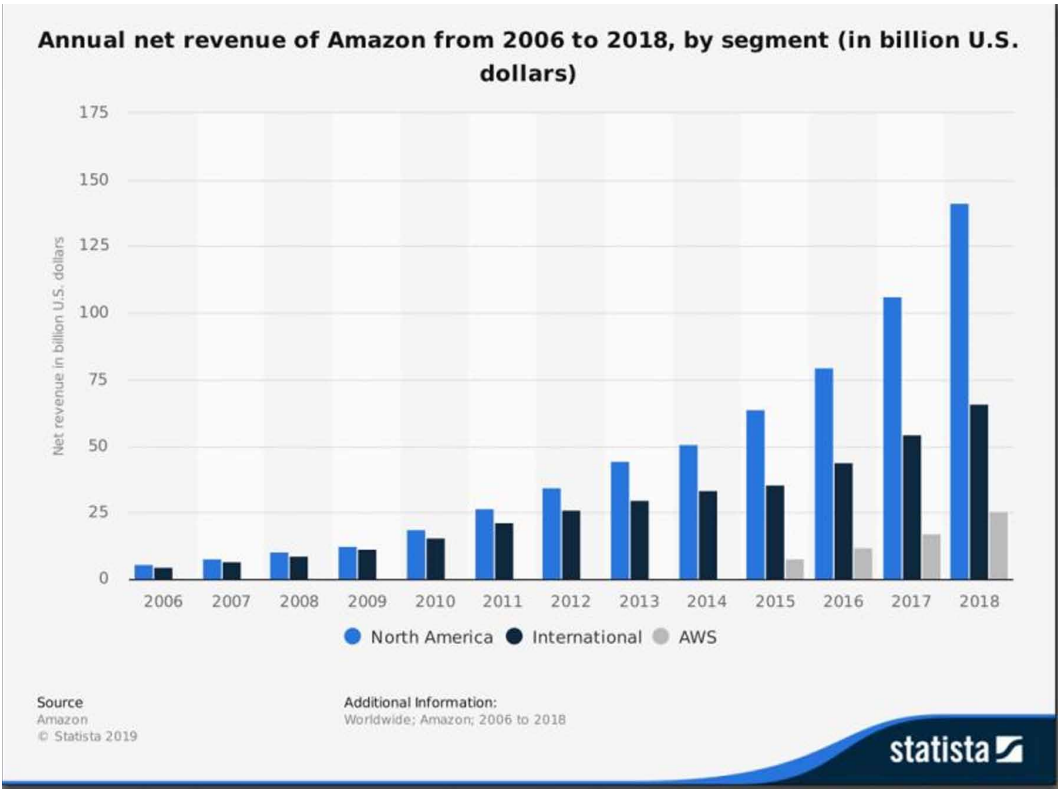


Figure 3. Amazon net e-commerce revenue from 2006 to 2018, by segment (in billion U.S. dollars)



find a solution. However, the skill gap between the students' performance and requirements still has not been explored despite this will contribute to training and cooperation systems in the future. This research aimed to find the gap between students' skills and required skills from the employers and then apply the industry-university-research cooperation ecosystem to narrow the gap and prosper the cooperation between the relevant parties.

1.3 Structure of the Thesis

This thesis contains five parts. Part one introduces the research background, purpose, and structure of this paper. Part two presents the visualization and trends of industry-university-research cooperation studies, then briefly introduces the terminologies, including cross-border e-commerce talent, skill gap, competency model used in e-commerce research, and business-university cooperation ecosystem model. Part three is the research on students' skill gaps, students' requirements for cooperation, and the incentives and barriers factors of industry-university-research cooperation. Part four is the implications of the research concerning the quantified skills gaps and companies' concerns. Finally, research implications are the conclusion of this paper, which mainly includes the tentative ecosystem model of industry-university-research cooperation regarding cross-border e-commerce talent cultivation and the research's limitation and prospect.

2.LITERATURE REVIEW

2.1 The Literature Review of University-Business Cooperation in Cross-Border E-Commerce Talent Cultivation In China

The research for cross-border e-commerce talent cultivation was dated back to 2014. And the analyses mainly focused on cross-border e-commerce talent cultivation in Zhejiang province and Hangzhou province. Hua Guozhen (2014) holds that to promote cross-border e-commerce talents, universities should develop interdisciplinary skills by using the foundation of traditional disciplines such as international trade, international logistics, e-commerce, and foreign language. Mei Jiangqiao (2014) confirmed Hua's opinion but raised the problem that there is a gap between the traditional discipline knowledge structures and the knowledge demanded by the companies. To solve this problem, Zhang Weiwei (2014) and XieYunli(2015) explore how to improve the forms of e-commerce platform training lessons. However, Liu Yang (2015) developed the previous research about training lessons by pointing out the lack of cooperation between universities and businesses.

To find out the essential skills the talents need to have, many researchers began synthesizing the critical skills demanded by the companies. Zhuang Xiaolan (2015) pointed out the cross-border e-commerce students should master the following four layers of abilities: foreign language skills, network technology appliance skills, the knowledge of literary and international trade laws, and the knowledge of logistics and finance. These skills have been further explored by Li Rong (2016), the researcher added professionalism to the required skills. These five skills then are proven by Su man (2016) through using interviews and questionnaires. Then, Lei Yang (2017) further improved it by analyzing the frequency of words in the conversation with entrepreneurs in successful cases for working in the cross-border e-commerce industry.

The study of industry-university-research cooperation ecosystem in cross-border e-commerce talent cultivation has been conducted since 2015. It builds a structure for talent training. Taking the cultivation of innovative entrepreneurial talents in cross-border e-commerce as an example, Fan Xinmin (2015) points out the industry-university-research cooperation ecosystem is the structure led by companies, focuses on industry-university cooperation, and uses the market orientation. Lian Yuanqiang (2015) believes that only by building an alliance with all the relevant parties in the e-commerce area can the university transform into an entrepreneurial university to promoting cross-border e-commerce talents development. But he doesn't detail the further operation of the ecosystem;

the research of Li Xinquan (2016) has amended the gap by giving a specific example of Liao Cheng vocational university. Using the five parties, government, companies, universities, e-commerce platforms, and government, as the essential elements of the ecosystem, he described how the Liao Cheng vocational university applied this ecosystem. In the latest research, Wu Xupin (2019) generates the operation of the industry-university-research ecosystem by classifying them into three processes, including organization, operation, and benefit mechanism. All of the research explored the method of industry-university-research cooperation. However, they often choose one side to find the mechanism for all the shareholders involved in the ecosystem. There is a lack of analyzing students' skills based on their performance instead of on the training plans.

2.2 The Literature Review of University-Business Cooperation in Cross-Border E-Commerce Talent Cultivation Research In Other Countries

Compared with the research on cross-border e-commerce talent cultivation in China, there is less relevant research in other countries. But the theories of industry-university-research cooperation ecosystem and the appropriate model for cooperation are prosperous in foreign countries. The main reason for the result is that the structure of talent groups is different in these countries. Students majored in digital marketing, e-commerce, international trade, and foreign language as the primary talent pool, concentrating on the information and technology industry. Moreover, information technology has taken an important role in cross-border e-commerce studies. However, most of the research is made mainly to promote the small-medium size companies' development (Ifinedo, P, 2011), Darch, H, and Lucas, T (2002) studied the possibility of applying internet training to promote the development of small-medium enterprises. As for the shortage of talented people in the job market, the companies face the problems like irrational competition in the job market, leading to the situation that employers have to pay more to gain talents but face the risks of fewer rewards. To solve this problem, Wright, P. M, and Dyer, L (2000) mentioned the importance of identify the three essential skills for agile employees and use the different methods to retain and inspire those talents. Though the study focus is on the Information Technology area, the work of Landriault (2000) in Computer Dealer News reported Joseph Messina, a Canadian country manager for Vienna, that the curriculum in the universities should be designed with the cooperation with companies. According to the literature reviews of studies in foreign countries, we discover the lack of research related to cross-border e-commerce talent cultivation, industry-university-research collaboration in the cross-border e-commerce field, or a systematic model for the plan of talent training in the university. But there are multiple theories related to industry-university-research cooperation, which could lay the foundation for the research.

2.3 The Definition of Terminologies

2.3.1 Cross-Border E-Commerce Talent

The concept of cross-border e-commerce talent first appeared in 2014, but it didn't point out the specific occupations related to this concept. The cross-border e-commerce talent is the students who majored in e-commerce with a solid theoretical foundation and practical operational skills (Hua, 2014). Mei Jiangqiao (2014) broadened the concept by adding the qualities that are required by the position. For instance, the ability to operate an e-commerce platform, dealing with international transactions, understanding the cultures of the customers' countries. However, the cross-border e-commerce talents have been divided into three layers based on their skills' level and represented by six regular jobs: customer service, operator, art designer, website manager, purchasing agent, and logistics manager (Zhu, 2016).

This research adopts the definition of cross-border e-commerce talent in China's Cross-border E-commerce Standard published in 2016 at a conference with the theme "Inter-industry integration and co-creation: cross-border e-commerce talent from a global perspective." The cross-border e-commerce talent refers to people who are competent for the jobs such as cross-border e-commerce customer clerk, customs declarer, merchandiser, cross-border e-commerce documentation specialist, foreign

trade clerk, the operation manager of B2B platform, the operation manager of B2C platform, the chief inspector of B2C platform, risk manager for e-commerce, legal specialists, and risk control manager.

2.3.2 Skill Gaps

When the economy transformed into a service-based economy, the industry called for more and more frequent collaborations in the workplace. Thus, employees are expected to have strong “soft” skills, such as critical thinking and problem solving, collaboration, teamwork, and efficient and timely communication skills. Meanwhile, the employers hope the employees to be able to integrate knowledge from different fields. Therefore, this change forges a gap between the expected level of the skills in the workplace and the existing skills level the employees have (The Economist Intelligence Unit, 2014). The skill gap analysis has been used to find the area the training agency needs to improve at now or in the future, identify the essential skills that the employees need to grow, and distinguish the proper candidates in the recruitment.

There is a trend that this human resource tool began to be used as a method of discovering the problems in education. For example, J.P Morgan has applied this strategy to identify the present skill gaps for high education institutes in New York.

As for the skill gap for a salesperson, the Manpower Group 2018 Talent Shortage Survey Results conducted in the United States showed the skilled trades is remained the most challenging job to fill as the position demands a mixture of soft skills and proficient knowledge for products (Manpower Group, 2018). In the research, the skill gap is the gap between the essential skills demanded by companies and the present performance of students who majored in the relevant majors have for those crucial skills.

2.3.3 Competency Model

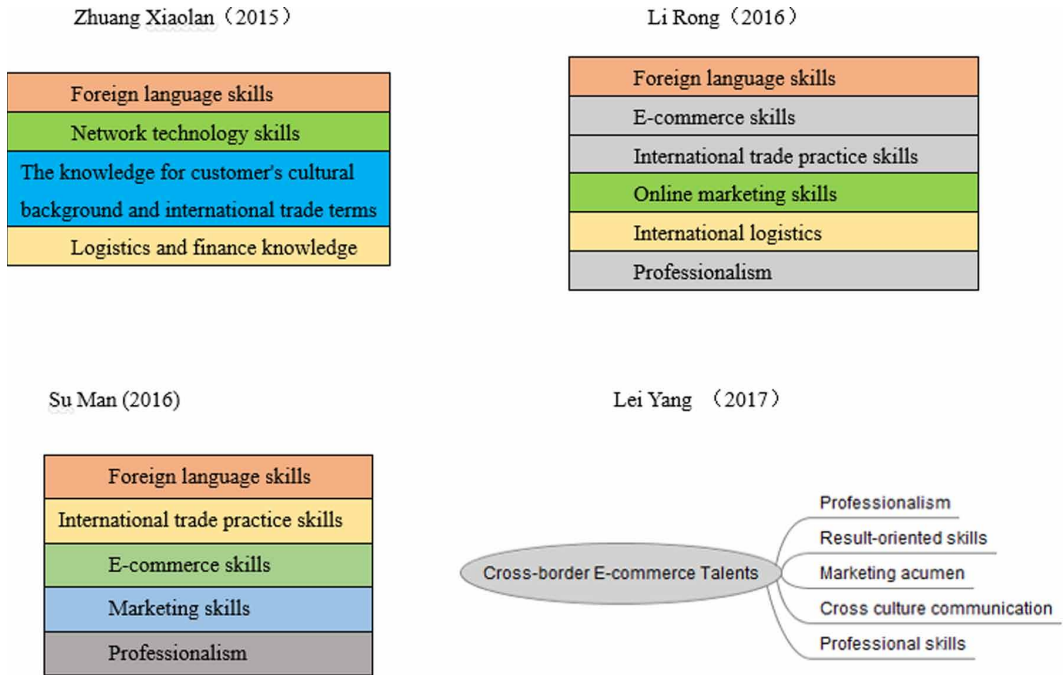
Competence was first introduced as a performance motivator by R.W.White (White, 1959). The seminal paper, “Testing for competence rather than for intelligence,” written by David McClelland, illustrated the defects of traditional intelligence tests, triggered on a discussion on the significance of competence again (McClelland, 1973). The competency model is a framework for distinguishing essential skills and knowledge for an occupation. The model embodies the vital skills needed for successful performance. In the research, the competency model was built on the foundation of previous research. The seven essential skills have been made by synthesizing the studies and then substantiating them by comparing them with the information on the recruiting websites. The competency model for cross-border e-commerce talents has been divided into two parts: the professional skills and soft skills displayed on the tables.

To find out the essential skills demanded by the work, the author collected 100 pieces of recruitment information related to cross-border e-commerce on the largest job-hunting websites in China. Then the data is subdivided into two groups: job requirement and job description. First, the words are split based on their meaning, then the words which have the length of or over two characters are selected and then grouped. After that, the processed words are re-processed again to restore some inappropriate split parts. After splitting the recruitment information and grouping the familiar words in ROST Content Mining Appliance, we find out the frequency of the critical elements for the job as a salesperson in the international trade department.

The frequency of job descriptions revealed the crucial skills for working as a salesperson. Regarding the result of test analysis, international trade, product management, and English communication are the top three main parts of a salesperson’s daily routine.

Compare with the previous analysis in the work description, many new terms, which rarely appeared on the work description, have been added to the work requirement. These words are related to network technology appliance and international trade. The ability to utilize different computer software and understand different trade laws are mostly required by employers. But the result shows the synthesized competency model could cover the important area of position in cross-border e-commerce. The noticed change as trade laws has been included in the adapted competency model.

Figure 4. The synthesized competency model of previous works



2.3.4 The Industry-University-Research

Table 1. The competency model in the research

Professional skills	Soft skills
Foreign Language	Critical thinking
International Trade	Cooperation ability
Product Management	Multitask ability
Network Technology	Planning ability
Market Acumen	Information acquisition ability
Online Marketing	
Team Work	

3. METHODOLOGY

3.1 Questions of the Research

By reading enough materials and studying human resources theories, the author researched students' skill gaps to work in cross-border e-commerce and transnational e-commerce companies. Although many previous studies have examined the needs of the cross-border e-commerce companies and the current training system for e-commerce talent cultivation, this research will qualify the current skill

Table 2. The frequency of keywords in the job descriptions

Word Frequency		
Foreign Language Communication	English	14
	Communication	32
	Mail-writing	12
<u>International Trade Practice</u>	Service	50
	Market	35
	Sales	30
	Business	20
	Negotiation	16
	Trade	43
	Inquiry Management	24
	Order	42
	Follow	21
	Sort	18
	Delivery Management	17
	After-Sales	16
	Document	15
	Declare	15
Product Management	Handle Platform	28
	Operation	23
	Evaluate	14
	Payment	14
Network Technology Application	Maintain	39
Market Acumen	Explore	22
	Analysis	13
Online Marketing Ability	Increase Impression	9
	Mail	12
Teamwork Ability	Cooperation	9
	Report	15
	Department	8

level of potential e-commerce job pursuer, analyze the incentives and obstacles of industry-university-research cooperation, and build an industry-university-research cooperation ecosystem trail model for cross-border e-commerce talent cultivation.

To secure the validity of the data, the author collected around ten thousand cross-border e-commerce enterprises data on Tianyancha official websites and collaborated with an online curriculum timetable appliance Zhuangfei.hpu timetable to reach out to ten thousand students. The questions of the survey are elaborately designed to find out the skill gaps, and it includes the important factors in the industry-university-research cooperation ecosystem theory.

Regarding the respondent group consists of cross-border e-commerce companies, our questionnaire focused on the following parts.

Skill gap:

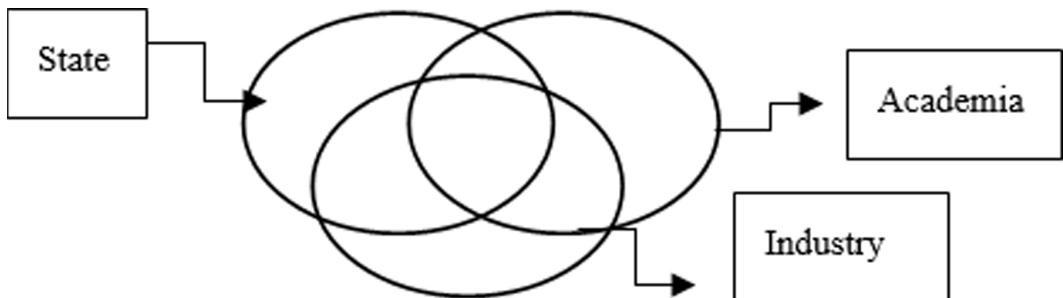
1. The importance of seven professional skills and the top four professional skills that the fresh graduates lack.
2. The importance of five soft skills and the top three soft skills that the new graduates lack.
3. What are the critical skills that the companies attach importance to on-the-pre-job training?
How about the effectiveness of different methods of pre-job training?

industry-university-research cooperation:

Table 3. The frequency of keywords in the job requirements

Word Frequency		
Foreign Language Communication	English	69
	Communication	27
International Trade Practice	Service	30
	Sales	80
	Business	20
	International trade	24
	Process	20
	Negotiation	12
	Import and Export	12
	Law	14
Product Management	Platform	56
Network Technology Application	Proficiency	14
	Computer	14
	Software	12
Market Acumen	Pressure	11
Online Marketing Ability	E-commerce	9
Teamwork Ability	Team	24
	Spirit	23
	Cooperation	19
	Consciousness	18
	Responsibility	14

Figure 5. The Triple Helix Model of University-Industry-Government Relations

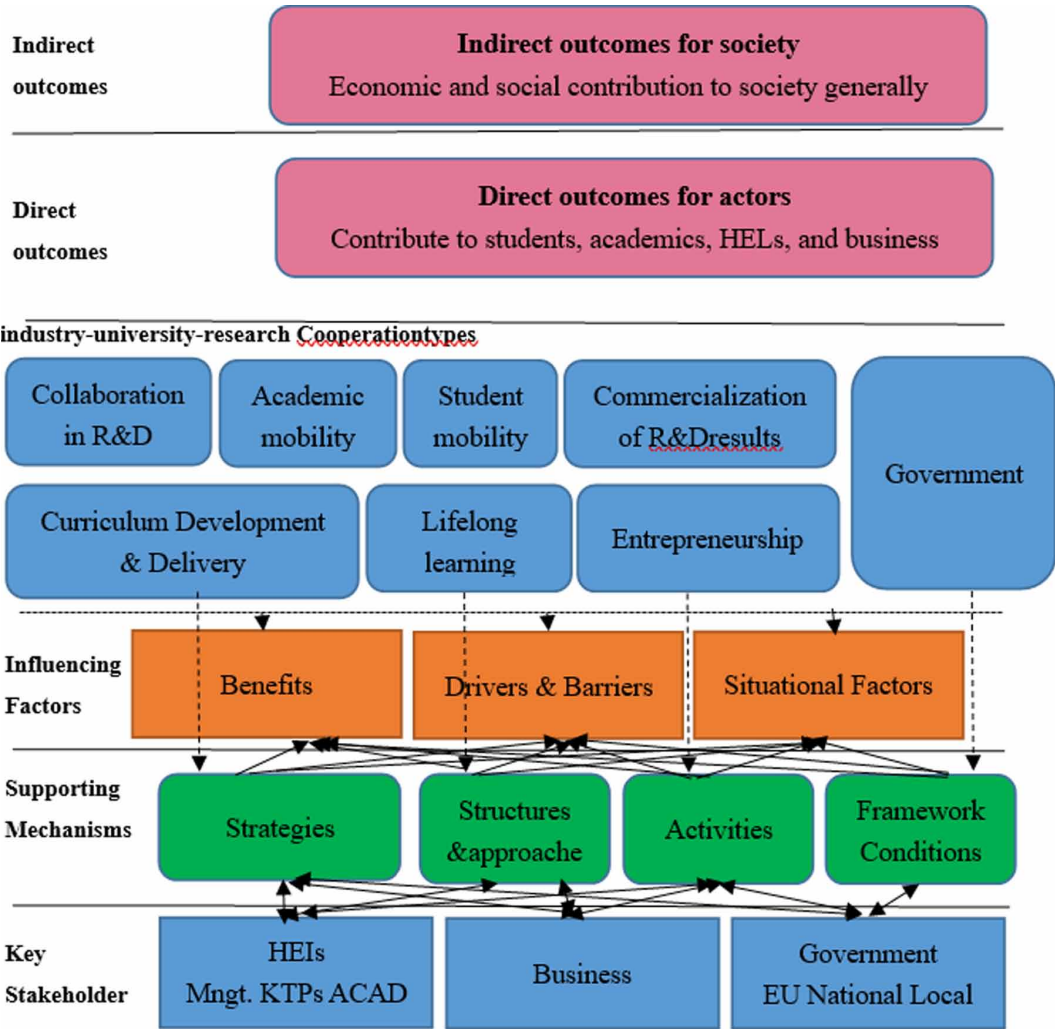


4. Did the company has developed a cooperation relationship with schools in the past three years? If it is true, is it successful?
5. What kind of barriers and incentives factors might companies encounter in university-business cooperation?
6. The expectation from cross-border e-commerce companies as for industry-university-research collaboration and government support?

The respondent group consists of students who aimed to pursue the job in cross border e-commerce companies, and our questionnaire has been divided into seven dimensions.

Skill gaps:

Figure 6. The industry-university-research ecosystem model



1. The questions for foreign language communication ability include standardized test results, listening, speaking, and foreign culture.
2. The questions for international trade practice ability include the familiarity with international trade practice, international trade terms, and the subjects such as economics and finance.
3. The questions for product management on e-commerce platforms include evaluation of pricing and tracking the market's trend.
4. The questions for network technology application ability include the evaluation of capacity for using different essential appliances and websites.
5. The questions for market acumen include analyzing the skills for capturing market information and the ability for data processing.
6. The questions for online marketing ability include the evaluation of integrated marketing techniques, the capability of combating work stresses, and the depression of receiving refuses.
7. The questions for teamwork ability include the assessment of networking, the frequency of conflicts, and the communication skill with team members.

3.2 Research Subjects

As for selecting the representative group, the author added the evaluation function to the questionnaire for the student. Thus, the college students who are interested in e-commerce will be able to get a report on their performance after finishing the investigation. Moreover, the incentive survey is not based on monetary reward but based on interest. To get an accurate evaluation of the evaluation, the students had to be sincere with their performance in the seven professional skills which are analyzed in the process. According to the Leverage-Salience Theory, the respondents' wiliness to join in the survey relates to the feature of the topics (Groves, Singer, & Corning, 2000). The survey could attract students who are passionate about cross-border e-commerce.

Meanwhile, using the keywords, such as cross-border e-commerce, e-commerce, and import and export, ensure the precision and randomness of the sample. These companies are selected from the lists based on the companies' revenue. By choosing the companies which provide their contact information on the website, the author contacted them mainly through e-mail in order to reduce interruptions in their work and left personal contact in the e-mail. It shows that many enterprises are interested in this topic and impressed by the further cooperation opportunities with Hubei University of Science and Technology. Some of them provide more relevant information after finishing the questionnaires.

3.2.1 Basic Information of Companies

The questionnaire for cross-border e-commerce companies has been delivered to the mail of those companies' official mailbox. Though some scholars have criticized mail questionnaires as having a low return rate, the author tried to avoid its defect by using the techniques: source and social setting, the promise of confidentiality, and personalizing the content in the e-mail (Duncan, 1979). In the end, the total valid number of respondents is 49. The necessary information of respondents is listed below:

3.2.2 Basic Information of Students

The student respondents are appealed by the main benefit that will come from finishing the questionnaire. The drawing activity in the survey includes the gift as a book related to cross-border e-commerce. This feature attracts many students who are interested in e-commerce. The necessary information about students' is listed below:

3.3 Methods and Procedures of the Research

The research mainly adopted four methods: documentary method, test analysis, questionnaire, and quantitative analysis. The pilot research in 2018 explored a specific case of cross-border e-commerce industry-university-research cooperation in Hubei University of Science and Technology. The investigation of the cooperation structure led by a third party provides information about the needs of students, companies, and academies for the new cooperation form. The research uses the documentary method to synthesize the competency model with soft and professional skills for further investigation for formal research. The test analysis has been applied to evaluate the information of 100 jobs for cross-border e-commerce works in job-hunting websites.

It ensures the competency model could cover the requirements and work contents for the results.

Then, to quantify students' performance and the gap between the requirements and present skill level, the author designed quantitative self-evaluate questionnaires for students and a questionnaire for companies.

To confirm the subject groups, the author found the available resources for collecting convincing data and devising the questionnaire for both groups. During this process, my tutor gave me numerous helpful suggestions on valid sourcing information and handling data. Then, the author found the available data on the Tianyancha website and downloaded ten thousand company information. Finally, with the support from one developer of an online curriculum timetable, the author reached out to ten thousand active users.

Table 4. The basic information of companies

Column	Type	Number	Percentage																																													
Location	<div><p>Total</p><table><thead><tr><th>Location</th><th>Number</th><th>Percentage</th></tr></thead><tbody><tr><td>Tianjin</td><td>18</td><td>37%</td></tr><tr><td>Shanghai</td><td>5</td><td>11%</td></tr><tr><td>Beijing</td><td>3</td><td>6%</td></tr><tr><td>Guangdong</td><td>3</td><td>6%</td></tr><tr><td>Shandong</td><td>3</td><td>6%</td></tr><tr><td>Henan</td><td>2</td><td>4%</td></tr><tr><td>Hubei</td><td>2</td><td>4%</td></tr><tr><td>Anhui</td><td>2</td><td>4%</td></tr><tr><td>Fujian</td><td>2</td><td>4%</td></tr><tr><td>Guangxi</td><td>2</td><td>4%</td></tr><tr><td>Chongqing</td><td>1</td><td>2%</td></tr><tr><td>Hebei</td><td>1</td><td>2%</td></tr><tr><td>Shanxi</td><td>1</td><td>2%</td></tr><tr><td>Jiangxi</td><td>1</td><td>2%</td></tr></tbody></table></div>			Location	Number	Percentage	Tianjin	18	37%	Shanghai	5	11%	Beijing	3	6%	Guangdong	3	6%	Shandong	3	6%	Henan	2	4%	Hubei	2	4%	Anhui	2	4%	Fujian	2	4%	Guangxi	2	4%	Chongqing	1	2%	Hebei	1	2%	Shanxi	1	2%	Jiangxi	1	2%
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Shanxi	1	2%																																														
Jiangxi	1	2%																																														
Number	Above 300	11	22.45%																																													
	101-300	22	44.9%																																													
	31-100	9	18.37%																																													
	Below 30	7	14.29%																																													
Main Line	Cross-border Import & Export	6	12.24%																																													
	E-business Platform	31	63.27%																																													
	Logistics	8	16.33%																																													
	Others	4	8.16%																																													
Position	Rank and file	16	32.65%																																													
	Grassroots managers	20	40.82%																																													
	Middle and above managers	13	26.53%																																													

The questionnaire for students contains seven dimensions related to the professional skills evaluation, which the quantitative analysis could quantify. Meanwhile, the rating system for professional skills and soft skills designed for companies' feedback enables the further exploration of skill gap research. Furthermore, the feedback of incentives and barriers factors from companies in industry-university-research cooperation in the survey provides an important foundation for building the industry-university-research cooperation ecosystem for cross-border e-commerce talent cultivation.

Table 5. The basic information of students

Column	Type	Number	Percentage
Location	<div><p>Total</p><p>Legend:</p><ul style="list-style-type: none">Fujian, Sichuan, Zhejiang, Chongqing, GuangxiShandong, Neimenggu, Tianjin, Shanxi, JiangsuLiaoning, Henan, Guangdong, Hubei, AnhuiGansu, Shanghai, Hebei, Jiangxi, Beijing</div>		
Grade	Sophomore	104	17.14%
	Junior	81	28.93%
	Senior	95	33.93%
Major	International Trade	41	14.64%
	Finance	37	13.21%
	Foreign Language	62	22.14%
	E-commerce	62	22.14%
	Marketing	19	6.79%
	Others	59	21.07%
University	First-tier university	87	31.07%
	Second-tier university	156	55.71%
	Third-tier university	24	8.57%
	Three -year college Education	13	4.64%

4. RESULTS AND DISCUSSIONS

4.1 The Brief Introduction of Pilot Research Results

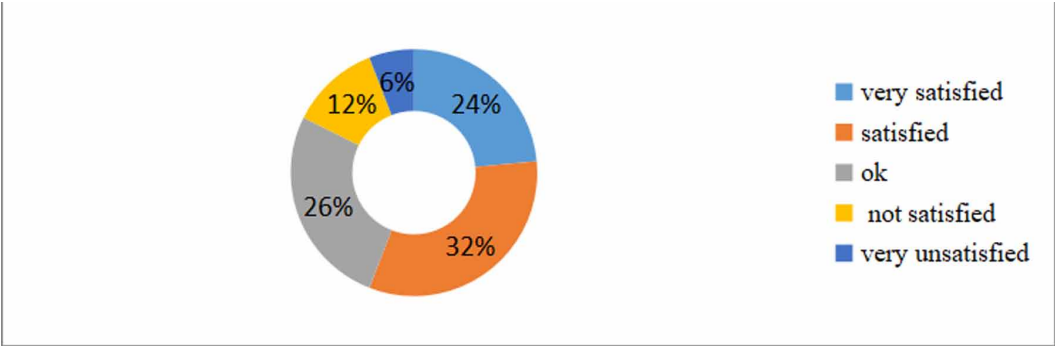
The trial research made in 2018 focused on the evaluation of industry-university-research cooperation based on the third party, a for-profit e-commerce company located in Guangdong. This company provided training courses for majors related to cross-border e-commerce and a platform for companies to find their employees.

The research objects are fresh graduates who have received the training courses from the company and found a job on the platform, and the companies that have chosen the third party's service and the managers in academia.

Based on the response from the total 66 students, around half of the students are unsatisfied with the training courses provided by the company.

Many students gave feedback through further investigation as the pre-job training is mainly focused on theoretical knowledge and is not well planned. Some students believed the lessons are not accordant to their current level.

Figure 7. Are you satisfied with the training courses given by the company?

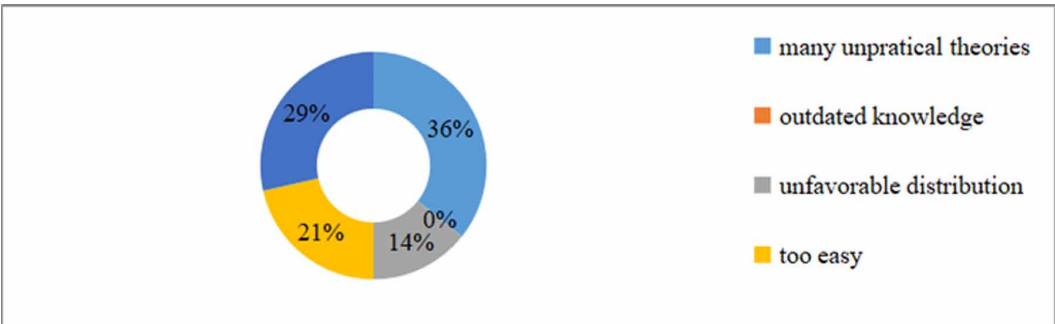


The students also expressed their expectations for training courses provided by the company. More than half of students believed that the management of cross-border transactions is the most helpful course, followed by communication skills voted by 13% of students and international trade introduction voted by 12%. In comparison, 9% of students thought the technique for increasing impression is the most helpful course.

Based on the trial research analysis, the companies looked for employees familiar with international law, the terms for online transactions, and logistics. While the universities hoped the third party would provide the courses that are not the repetition of the courses offered in the universities.

The trial research revealed the need for training courses upgrades. However, the trial research focused on making a report for the general performance of the third party. In this way, it is unlikely for the trial research to elaborate on the actual needs for training and cover companies' concerns. In

Figure 8. Why are you unsatisfied with the courses?



addition to that, some questions on the questionnaires were sensitive, which make companies hesitant to respond. The research will also remedy those defects by redesigning questionnaires and approaches.

4.2 Results of the Research

4.2.1 Results of Companies' Questionnaires

4.2.1.1 Professional Skill Gaps

Based on questionnaires from companies, the result showed that more than 60% of companies would choose employees who have worked for more than one year. This discovery is related to the importance of degrees for seven professional skills rated by companies. In this survey, we use 1-5 to mark importance degree. The meaning of the numbers is:

Five: very important

Four: quite important

Three: ok

Two: quite unimportant

One: very unimportant

Before analyzing the importance degree of different skills, a reliability test has been conducted for the seven elements on an online data science tool SPSSAU (Appendix VII). The seven elements have been analyzed in the Cronbach's alpha reliability test. According to the commonly accepted rule in Cronbach's alpha reliability test, the result of Cronbach α is 0.801, which shows the collected data is of good quality and reliability.

Table 6. The correlation between Cronbach's alpha and internal consistency

Cronbach's alpha	Internal consistency
$0.9 \leq \alpha$	Excellent
$0.8 \leq \alpha < 0.9$	Good
$0.7 \leq \alpha < 0.8$	Acceptable
$0.6 \leq \alpha < 0.7$	Questionable
$0.5 \leq \alpha < 0.6$	Poor
$\alpha < 0.5$	Unacceptable

The graph shows the international trade ability, foreign language ability, and online marketing ability are the top three most important skills that companies expect the graduate to have. And this phenomenon explained why most companies decided to choose employees who have experience.

The companies' questionnaires also provide feedback on the skills employers think the graduate is short of.

With the comparison of the sequence of the results of the importance rate given by the companies, the difference represents the gap in the skills. Thus, according to the difference of sequence, international trade is the most significant skill the fresh graduates need to improve, followed by market acumen and product management skills on e-commerce websites.

4.2.1.2 Soft Skill Gaps

Table 7. The importance degree of professional skills rated by companies

Choice	1	2	3	4	5	Average
Foreign Language	1(2.04%)	2(4.08%)	5(10.2%)	23(46.94%)	18(36.73%)	4.12
International Trade	0(0%)	3(6.12%)	8(16.33%)	16(32.65%)	22(44.9%)	4.16
Product Management	2(4.08%)	4(8.16%)	14(28.57%)	14(28.57%)	15(30.61%)	3.73
Network Technology	0(0%)	4(8.16%)	10(20.41%)	20(40.82%)	15(30.61%)	3.94
Market Acumen	0(0%)	5(10.2%)	5(10.2%)	21(42.86%)	18(36.73%)	4.06
Online Marketing	1(2.04%)	2(4.08%)	5(10.2%)	23(46.94%)	18(36.73%)	4.12
Team Work	0(0%)	3(6.12%)	8(16.33%)	16(32.65%)	22(44.9%)	4.16

Table 8. The vote for top 3 professional skills fresh graduate lack of

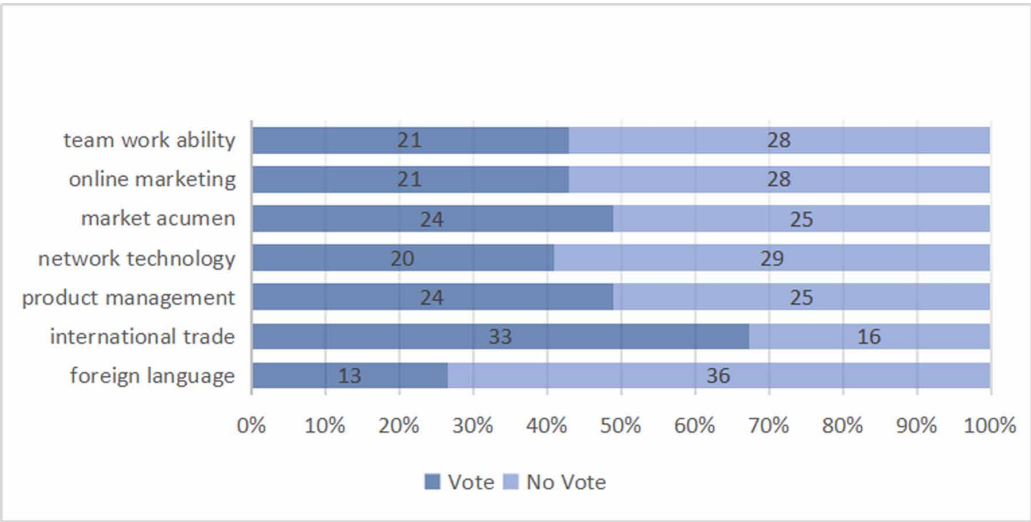


Table 9. The sequence of importance degree and shortage degree

Name	Sequence of importance	Sequence of shortage	Difference
Foreign language	3	6	-3
International trade	1	1	0
Product management	6	3	3
Network technology	5	4	1
Market acumen	4	2	2
Online marketing	3	5	-2
Team workability	2	7	-5

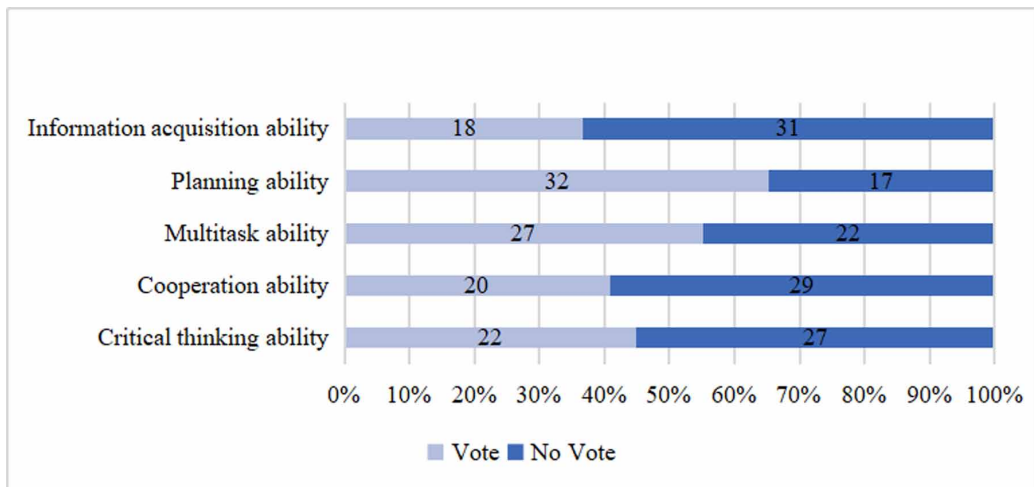
Secondly, as for the soft skills performance, the companies gave the following feedback. According to the commonly accepted rule in Cronbach's alpha reliability test, the result of 0.799 showed the collected data of good quality and reliability (Appendix VIII)

Based on the companies' responses, there is merely little difference in soft skills requirements. But when we checked the soft skills that fresh graduates lack, we could discover the planning ability has the highest votes, followed by multitask-dealing ability and critical thinking ability. This result was correspondent to the importance degree rating given by the companies.

Table 10. The importance degree of soft skills rated by companies (one null has been deleted from the table)

Choice	1	2	3	4	5	Average
Critical thinking	1(2.04%)	0(0%)	7(14.29%)	22(44.9%)	19(38.78%)	4.18
Cooperation ability	1(2.04%)	2(4.08%)	8(16.33%)	16(32.65%)	22(44.9%)	4.14
Multitask ability	1(2.04%)	0(0%)	9(18.37%)	19(38.78%)	20(40.82%)	4.16
Planning ability	1(2.04%)	0(0%)	7(14.29%)	22(44.9%)	18(36.73%)	4.17
Information acquisition ability	1(2.04%)	2(4.08%)	8(16.33%)	18(36.73%)	20(40.82%)	4.1

Table 11. The vote for top 3 soft skills fresh graduate lack of



4.2.1.3 The Pre-Job Training in The Companies

The research includes the situation of pre-job training in cross-border e-commerce companies to navigate the training conducted in universities or incubators. 40 out of 49 companies' employees said their companies provide pre-job training courses for the new employees. There are three choices offered for employees to choose which methods their companies used to give pre-job training to their employees. By deleting one valid questionnaire with the null answer for this question, there are the average scores for each method. From the table, the conclusion could be drawn that Though most companies adopt the method as managers provide the training courses for their employees, the training courses provided by the professional training agencies still have a higher average score than others.

Table 12. The average score of different pre-job training methods

Average score					
Title	The method of pre-job training				Total
	Null	Supervisor 1 to 1	Professional training agencies	Group training	
Rate	0	8.174	8.6	8	6.208

Then, by analyzing the focuses of pre-training and daily training, the result could compare with the skill gap results. If there are fewer courses for some essential skills present on the skill gap, it shows that it was necessary to provide the additional courses at school. Since foreign language skills are related to customers’ communication, the research changed them into communication skills when it comes to the questions associated with pre-job training and daily training.

Table 13. Which are the top 4 focused skills in pre-job training



Compared with the previous skills gap result, the importance degree and focused courses don't have a large gap. Only network technology skills have been emphasized in the training courses. While for those companies who didn't have training courses, their daily training lessons' focuses are listed below:

Table 14. The sequence of importance degree compared to the top 4 focused skills in the pre-job training

Name	Sequence of importance	Sequence of training
Foreign language	3	3
International trade	1	1
Product management	6	5
Network technology	5	2
Market acumen	4	5
Online marketing	3	4
Team workability	2	7

Through further research, two phenomena need to be noticed. First, most companies that don't have pre-training courses are small and medium-sized companies. Secondly, the structure of the daily training lessons has three different proportions of classes compared to the companies which have pre-job training courses. These companies paid less emphasis on network technology ability but more on the product management ability on the e-commerce platform. Thus, this result may give those companies some insights into their structure of training courses.

4.2.1.4 The Industry-University-Research Cooperation Situation

Among the 49 respondents, 21 companies have collaboration with universities at now and followed by 12 companies that had cooperation with universities in the past three years. Most of the collaboration is with first and second-tier universities, but less with the third tier or vocational universities. This reflected that some companies are hesitant to collaborate with the third tier or vocational universities. Then, as for the attitude towards whether industry-university-research cooperation is successful, most of the enterprises showed a neutral or negative position.

To explore the incentives and barriers factors for industry-university-research cooperation, the author designed the following questions for companies to find out the structure of cooperation companies would like to join.

These results depicted the nature of the companies are for-profit organizations. Return on investment is their top priority. Therefore, they would like to ensure their financial profits as much as possible when collaborating with universities. The high turnover rate of students has become one of the top concerns for them. On the other hand, they are also attracted by the abundant human capital provided by the universities. By collaborating with universities, they can also improve their reputation in the industry.

Based on the research, the most favorable structure of industry-university-research cooperation is led by the company, then followed by the third party, universities, and government.

Table 15. Which are the top 4 focused skills in Daily training for companies that don't have pre-job training?

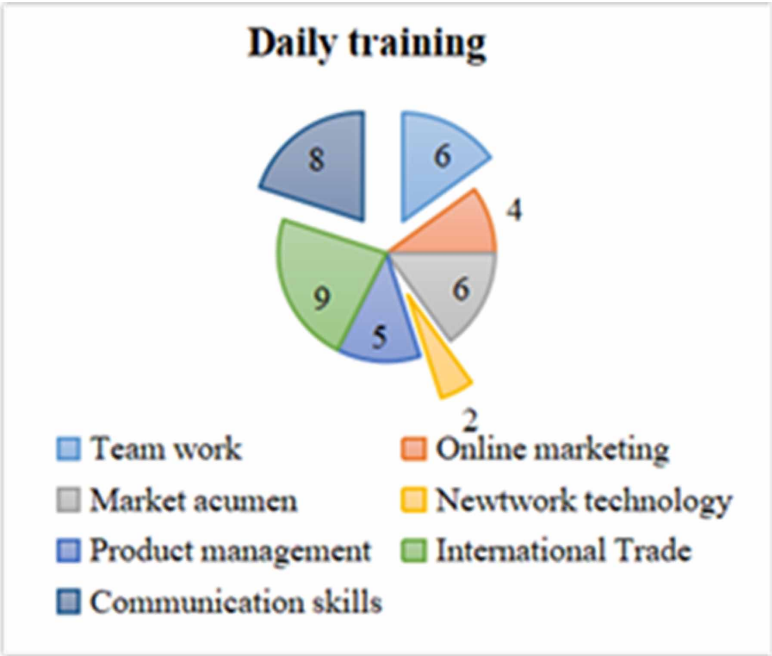


Table 16. Company's information

Type↵	Number↵
Above 300↵	1↵
101-300↵	1↵
31-100↵	3↵
Below 30↵	4↵

4.2.2 Results of Students' Questionnaire

4.2.2.1 The Overall Performance Of Students

The seven dimensions of skills related to cross-border e-commerce are graded by the answers to the designed questions. The overall performance has been recorded as a radar graph. An adaptation has been added to the first question of the questionnaire. The author has firstly used the Business English Certificate as a benchmark for English skills evaluation. But after considering the respondents might

Table 17. The sequence of importance degree compared to the top 4 focused skills in the Daily training

Name	Sequence of importance	Sequence of training
Foreign language	3	2
International trade	1	1
Product management	6	4
Network technology	5	7
Market acumen	4	3
Online marketing	3	5
Team workability	2	3

Table 18. The attitude towards whether the cooperation is successful

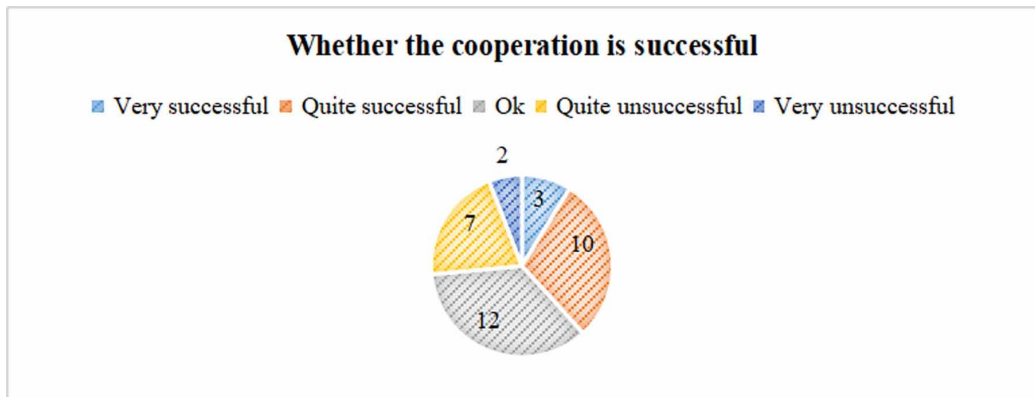


Table 19. The barriers and incentives for industry-university-research cooperation

Incentives	Vote	Barriers	Vote
Improve company image	28	Worry about return on investment	30
Lessen human resource's burden	24	Students left companies after training	26
Large talent pool	24	Lack of contraction settlement mechanism	15
The lower turnover rate of present employees	17	Not interested in training	15
Beneficial policies for talent	17	Can't identify sustainability	13
Lower cost to have knowledge from schools	12	Can't identify the effectiveness	12
Helpful to regional development	9	Less supportive policies	11
Find an opportunity to invest in training	8	Limited capital	9

not be able to register for this examination and the effectiveness of evaluating language skills in this test, the author transformed this answer into a multiple-choice answer without a score. The graph displayed below is the result after the adaptation.

Table 20. The favorable structure for industry-university-research cooperation

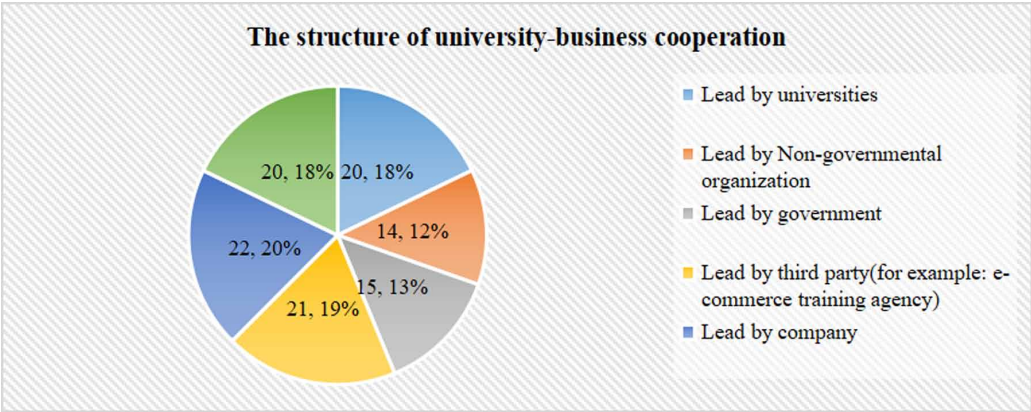
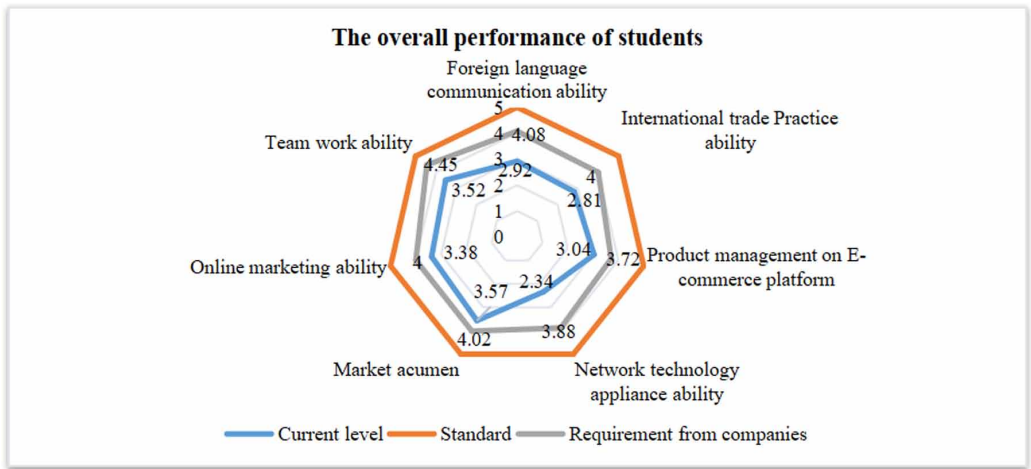


Table 21. The overall performance of students



The graph above revealed the fact that according to the importance degree of skills rated by the companies, the majority of students are short of foreign language communication ability, international trade practice ability, network technology appliance ability, and teamwork ability.

To elaborate on the skill gap, the research puts forward the tendency of students' performance from different majors and grades.

The tendency of international trade major students' performance exhibits the improvement of network technology appliance ability and international trade practice ability. Nevertheless, the online marketing ability, international trade practice ability, product management on an E-commerce platform, and network technology appliance ability lag behind the requirement from the companies.

For the foreign language group, the randomness of representatives and the subjective assessment had diluted some parts of the graph. However, it still can depict the foreign language major students' weaknesses in international trade practice ability, product management on an e-commerce platform, network technology appliance ability, and market acumen.

Table 22. The tendency of international trade major students' performance

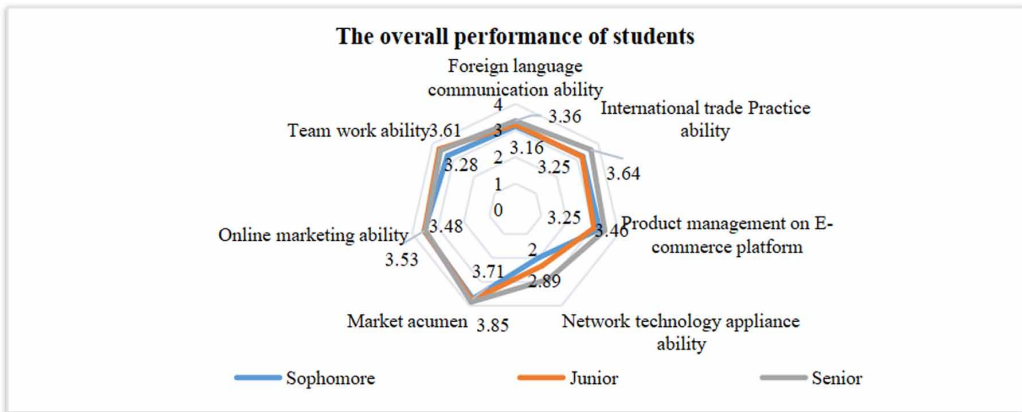
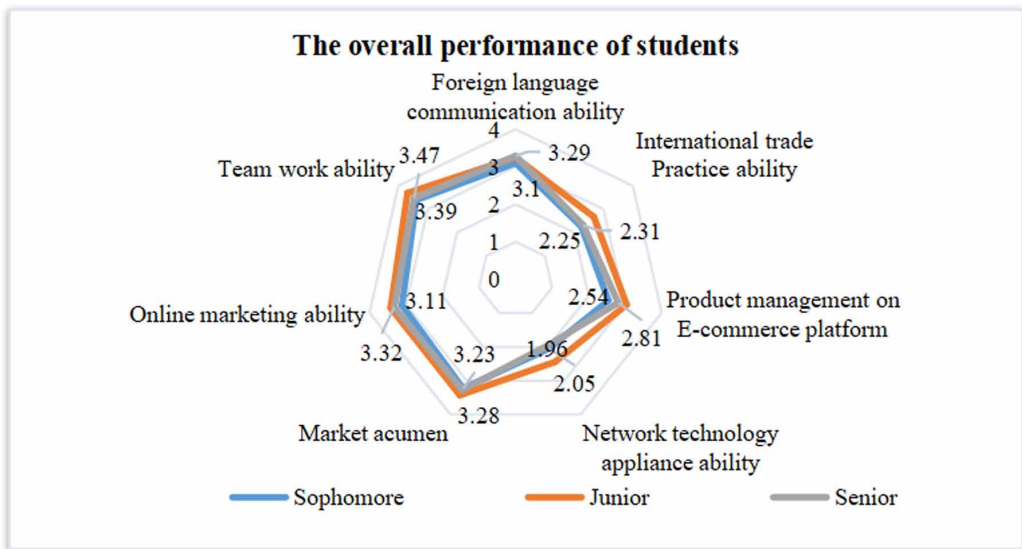


Table 23. The tendency of foreign language major students' performance



From the chart of e-commerce major students' performance, we could discover the rapid development of student's international trade practice ability in the junior and the improvement in network technology appliance ability.

The graph of finance students' performance showed an opposite tendency. Through taking a further look at the sample, the author discovered the shortage of senior finance students' samples in the investigation. By getting the average of the scores for each grade, the finance students are lack of network technology appliance ability and product management ability on an e-commerce platform.

Through evaluating the average scores of the performance for marketing major students, the research found out the shortage of students' skills lies in the network technology appliance ability and foreign language communication ability.

Table 24. The tendency of e-commerce major students' performance

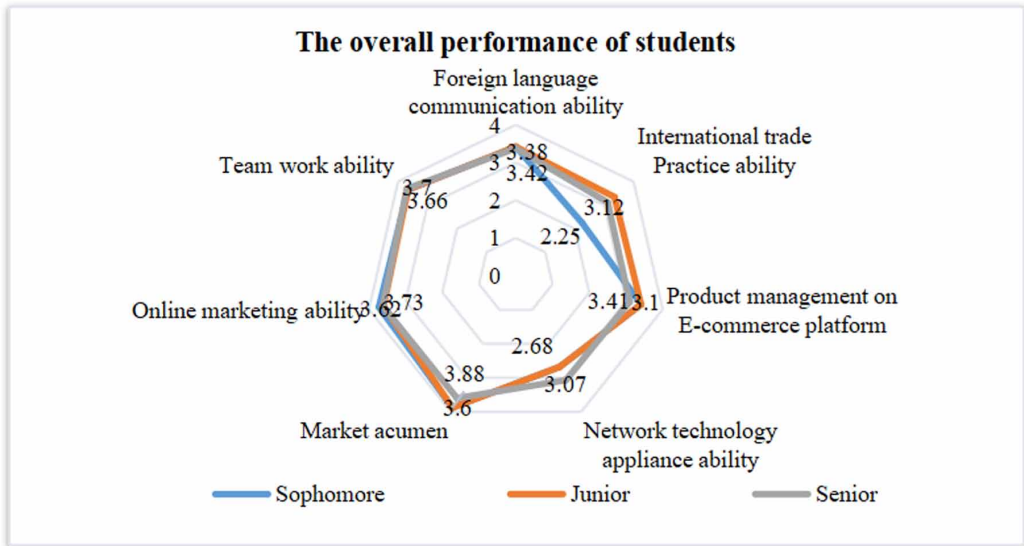
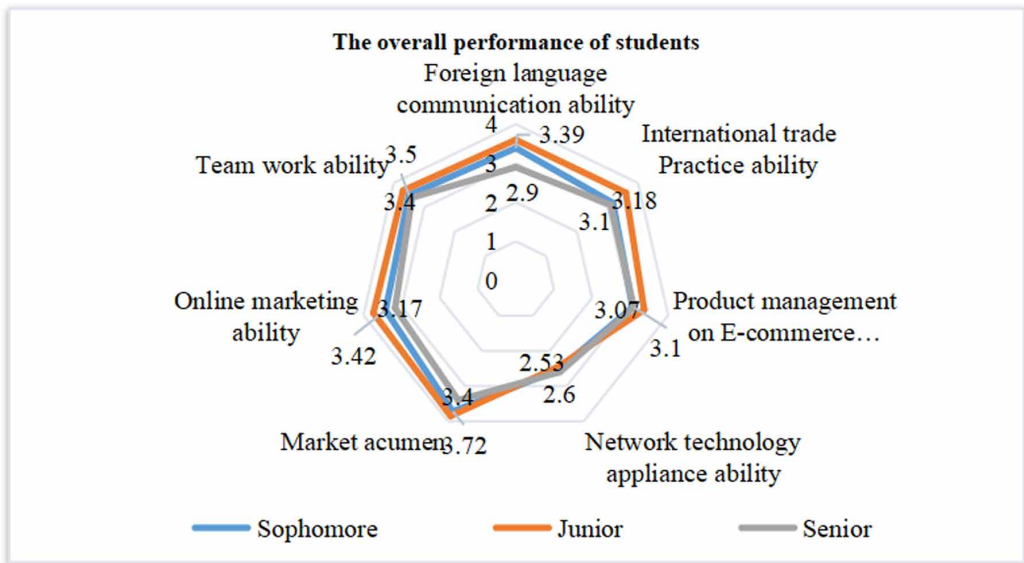


Table 25. The tendency of finance major students' performance



To find out the difference between students' perspectives and companies' perspectives towards different abilities, the students are invited to rate the importance degree of different skills and then vote for the probability of handling those skills.

The changes in the sequence displayed the significance of considering the mindset gap, especially for team work ability and online marketing ability. The ignorance of some essential abilities is likely to widen the skill gap.

Table 26. The tendency of marketing major students' performance

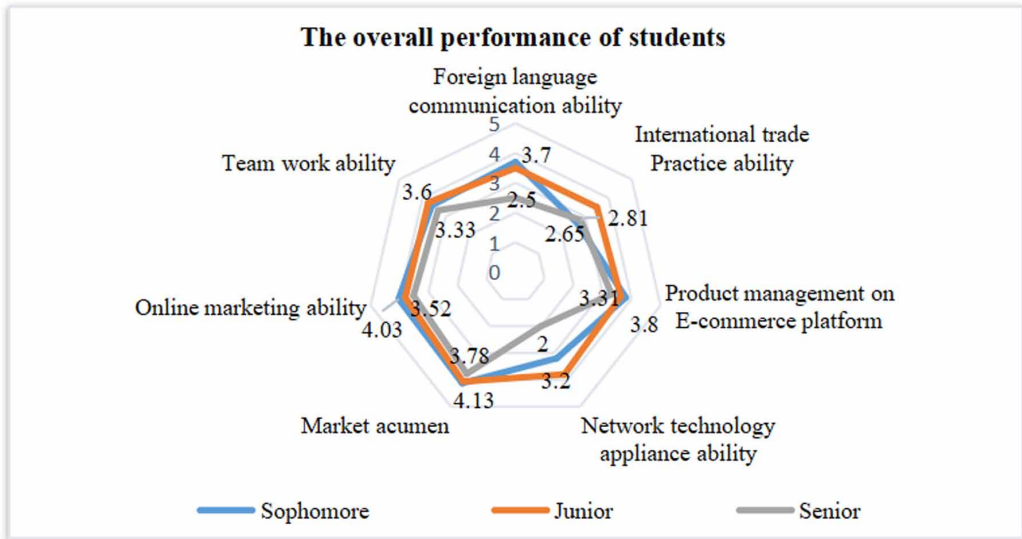


Table 27. The comparison of importance degrees for skills from students' and companies' perspectives

Name	Sequence of importance Companies	Sequence of importance Students
Foreign language	3	2
International trade	1	1
Product management	6	3
Network technology	5	4
Market acumen	4	5
Online marketing	3	7
Team work ability	2	6

Then, the comparison of the top 4 professional skills that students are lack of and the sequence of skills that students believe they can quickly get. It's surprising to find that students could form a similar sequence of skills with the sequence of the shortage abilities from companies' perspectives.

4.2.2.2 Students' Requirements for Industry-University-Research Cooperation

Regarding the results of the students' questionnaires, the majority of students look forward to having more practice opportunities or relevant courses provided by the companies. And they hoped there would be more and more real case studies of companies in their daily studies.

Different majors also show distinct demands for industry-university-research cooperation. The students majored in international trade and e-commerce put more emphasis on practice opportunities and case studies, while the students majored in finance favors the practice courses and case studies. Compared to those two groups, the foreign language major students hope to have more practice opportunities and practice courses, and the marketing major students want to have more practice

Table 28. The sequence of top 4 easier skills from students' perspectives compared with companies'

Name	Sequence of shortage abilities Companies' perspectives	Top 4 easier skills from students' perspectives
Foreign language	6	1
International trade	1	5
Product management	3	3
Network technology	4	5
Market acumen	2	4
Online marketing	5	2
Team work ability	7	1

opportunities, practice courses and lectures from companies. The difference among the groups hints the needs for designing cooperation activities based on the majors' preferences.

The advantages and disadvantages varied from first-tier universities to vocational schools. But the feedback for lacking practice opportunities and incubators showed that the cooperation between the universities and business is still on the surface. Most students still find it is difficult to gain real practice experience at schools.

Table 29. The requirements for industry-university-research cooperation from different majors (Percent %)

X\Y	Practice opportunities	Practice courses	Case studies	Lecture from companies	Incubators	Others	Total
International trade	65.85%	53.66%	60.98%	43.90%	31.71%	0.00%	41
Finance	48.65%	64.86%	59.46%	48.65%	27.03%	2.70%	37
Foreign language	70.97%	66.13%	56.45%	41.94%	59.68%	0.00%	62
E-commerce	67.74%	59.68%	70.97%	53.23%	48.39%	0.00%	62
Marketing	89.47%	63.16%	57.89%	63.16%	42.11%	0.00%	19
Others	72.88%	57.63%	64.41%	50.85%	47.46%	1.69%	59

The open questions for the training courses you want in the industry-university-research practice provide a further look at the students' demands. Most students hope to have more real case studies at schools instead of the simulation of practice and more courses related to the operation on the e-commerce platform.

Table 30. The requirements for industry-university-research cooperation from different majors (Value)

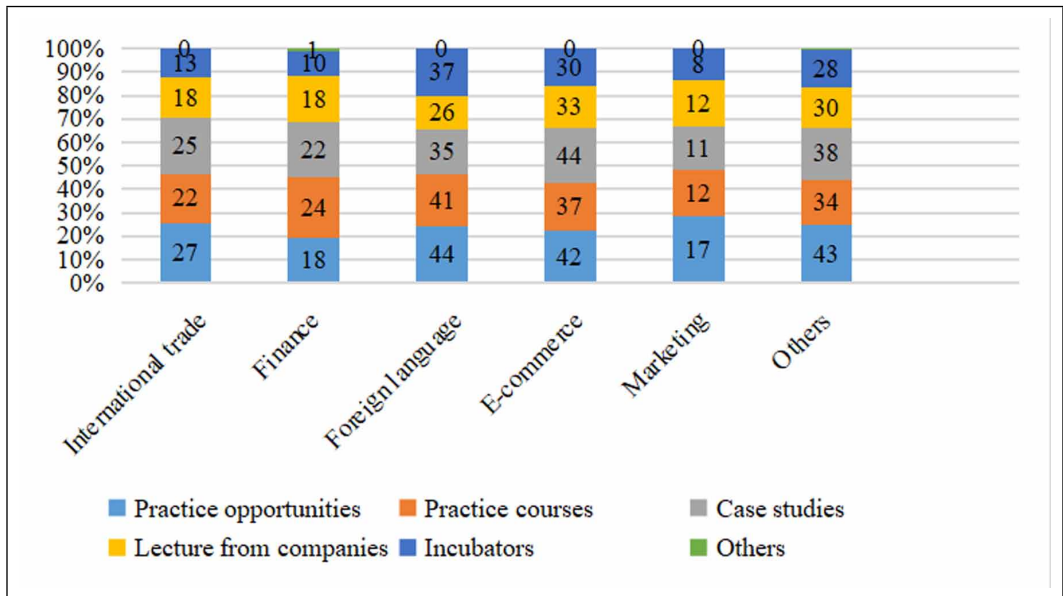


Table 31. The advantages of industry-university-research cooperation from different universities (Percentage %)

X\Y	Real case studies at school	Lecture provided by companies	Teachers with relevant work experience	Incubator for innovation and entrepreneurship	Abundant practice opportunities	Others	Total
First-tier universities	57(65.52%)	49(56.32%)	54(62.07%)	33(37.93%)	17(19.54%)	1(1.15%)	87
Second-tier universities	76(48.72%)	81(51.92%)	92(58.97%)	60(38.46%)	63(40.38%)	3(1.92%)	156
Third tier-universities	9(37.5%)	14(58.33%)	11(45.83%)	7(29.17%)	6(25%)	1(4.17%)	24
Vocational schools	8(61.54%)	4(30.77%)	9(69.23%)	6(46.15%)	3(23.08%)	0(0.00%)	13

5. CONCLUSION

5.1 Major Findings

5.1.1 The Skill Gap Between Students' Current Abilities and Required Abilities

According to the research, the skill gaps for students are on the international trade practice, market acumen, and product management abilities. However, the different understanding from students and companies towards the importance degrees of different skills is likely to widen the gaps in the future, since students attach less importance to online marketing ability and teamwork ability, which are two essential skills considered by companies. And the online marketing ability is not a usual focus for

Table 32. The disadvantages of industry-university-research cooperation from different universities (Percentage %)

XY	Most courses are related to theories	Less Lecture provided by companies	Less Teachers with relevant work experience	Less Incubator for innovation and entrepreneurship	Less practice opportunities	Others	Total
First-tier universities	39(44.83%)	40(45.98%)	46(52.87%)	33(37.93%)	27(31.03%)	3(3.45%)	87
Second-tier universities	83(53.21%)	72(46.15%)	89(57.05%)	74(47.44%)	47(30.13%)	0(0.00%)	156
Third tier-universities	10(41.67%)	13(54.17%)	7(29.17%)	12(50%)	5(20.83%)	1(4.17%)	24
Vocational schools	6(46.15%)	6(46.15%)	7(53.85%)	3(23.08%)	4(30.77%)	2(15.38%)	13

daily training among the companies, but it is the second important skill from companies' perspectives. Meanwhile, most enterprises believe students are lack of planning ability and multitask ability.

The speed of improvement is varied from major to major, but compared to the requirements from companies, students are still lack of the skills such as international trade practice ability, network technology appliance ability and product management ability.

5.1.2 The Problems for Industry-University-Research Cooperation

Most companies now have collaborated with universities, but more than half of them showed a neutral or negative attitude towards the result of cooperation. And compared to the result from students' feedback, most of the universities don't have in-depth collaboration with universities in providing practice opportunities and incubators for students. And they worry about the return on investment, and high turnover rate after training made companies worried about the cooperation, however they still eager to improve their company image and expand their talent pool through collaborations. The worry about the use of investment and the lack of conflict settlement mechanism contribute to the four favorable forms of cooperation, such as the structure of cooperation lead by the company, third party, universities, and multilateral parties.

5.2 The Referential Suggestions

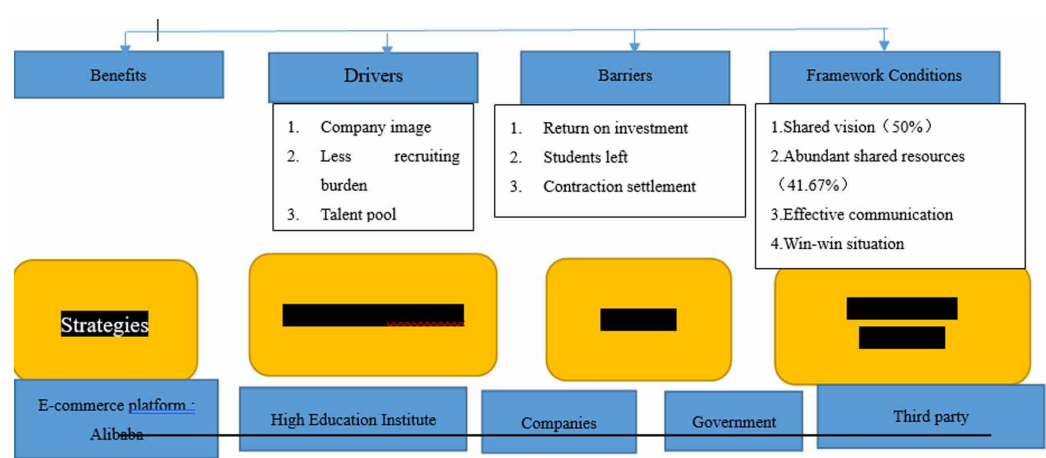
5.2.1 The Model for Industry-University-Research Cooperation Ecosystem For Cross-Border E-Commerce Talent Cultivation

In biology, the biotic diversity could increase the stability in the ecosystem or the result of the ecosystem (Odum, 1969). We added in the third party and possible shareholders to support the operation of the system. Integrating the feedback from both companies and students, the ecosystem for cross-border e-commerce is developed adopted the structure invented by Todd Davey and Thomas Baaken.

The primary purpose of the adopted model is to narrow the gap for students in international trade practice, market acumen, and product management ability.

As for the collaboration in R&D and promoting entrepreneurship, cross-border e-commerce is an interdisciplinary subject rather than subject related to technology transfer. The model of the collaboration of training base could be used as the best method for improving students' practice skills. On the one hand, most of the students are eager for more practice opportunities provided by companies. On the other hand, by building a training base on campus, companies will be able

Table 33. The appliance of industry-university-research ecosystem model in the cross-border e-commerce talent



to gain the talent directly from the universities as well as increase their reputation. Nevertheless, it also needs to be noticed that the collaboration needs sufficient funding and conflict settlement mechanism. The central government has also observed this concern. In 2018 National Development and Reform Commission, Ministry of Education of the People’s Republic of China and the other two departments have issued the Plan For Strengthening Investment and Financing Support for Training Base Construction This plan mainly aimed at providing funding support for the cooperation lead by universities, companies and governments (National Development and Reform Commission Website). But based on the research, the fourth type for cooperation as multilateral cooperation without leader should also be considered in the future.

As for the academic mobility and student mobility, the universities could provide more activities to sociable activities for students from different majors. Based on the research, the skills of students majored in different subjects have various speed in developing seven vital professional skills. Meanwhile, properly designed activities could boost their teamwork ability, which has been ignored by most students but emphasized by enterprises. The tutor for the students should not only be constrained to academic tutor but the professional tutors should also be included. To narrow the gap between the companies’ demands and students’ skills, New York University opened a work center for their students. There is guidance for students to improve their competitiveness in the job market. And the faculty consists of professional tutors as well as academic tutors.

As for the commercialization of R&D research, this model has changed it into working-integrated learning cooperation. There are two existing forms of collaboration. One is the order-type cooperation, and the other is the apprenticeship. When universities provide cooperation channels for the enterprises, these two forms could be considered as options instead of using one mode to cooperate with other companies.

As for the curriculum designed and lifelong learning, universities could work with a third party to ensure the training is consistent and stable. Online courses and network systems among alumni, students, and professionals could help students get advice all along with their development. This form of cooperation is loose but necessary, and it could be possible to use the multilateral model to develop the system.

5.3 The Limitation and Prospect For The Research

This research has provided a quantitative result for the skill gaps and found the incentives and barrier factors for cross-border e-commerce companies. It still has the following limitations.

First, the questions for students' ability test mostly based on self-evaluation. Thus, it is possible for students to overrate or underrate their skills. Although the questions have included many objective options, for instance, the specific requirements for network technology appliance abilities, it still can't avoid the different understanding of proficiency from people's perspectives.

Second, the assessment of students' skills is not made on the same group of students due to the time limit. Thus, this could not reflect the tendency of the same group of students. Meanwhile, the randomness of the sample can destroy the results of the ability evaluation. This defect has appeared when the researcher analyzed the data from the students majored in e-commerce and marketing.

Third, the skill gap analysis includes the employers' feedback for their employees. There is a direct linkage between those two groups. However, the research focused on the feedback for the overall graduating students. The discrepancy will lead to general feedback rather than specific feedback.

For future research, this research could provide insights into the evaluation of student's performance. The model for cross-border e-commerce abilities assessment can be applied in future studies, which could give a qualified performance for the students. The limitations of the study call for a correspondent survey for respondents and an abundant tracking survey. The systematic analysis of industry-university-research cooperation model will give inspirations for future studies.

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