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Haiyun Qiu
College of Management, Shenzhen University, China, 2017047016@email.szu.edu.cn

Jin'e Jiang
Greater Bay Area International Institute for Innovation, Shenzhen University, China, 745390965@qq.com

Wanying Li
Greater Bay Area International Institute for Innovation, Shenzhen University, China, winniewy354@163.com

Yichang Hao
Greater Bay Area International Institute for Innovation, Shenzhen University, China, 790420568@qq.com

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Research on the Regional Cooperative Innovation in Guangdong-Hong Kong-Macau Greater Bay Area

(HFull paper)

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Wanying Li, Greater Bay Area International Institute for Innovation, Shenzhen University, China, winnielwy354@163.com
Yichang Hao*, Greater Bay Area International Institute for Innovation, Shenzhen University, China, 790420568@qq.com

ABSTRACT

Regional collaborative innovation is an important issue in the development of Guangdong-Hong Kong-Macao Greater Bay Area. It promotes the exchange of science and technology resources among cities and regions, and realizes the coordinated development of science and technology in the Great Bay Area. This study examines the collaborative development in the Great Bay Area from the perspective of regional collaborative innovation. The development of regional collaborative innovation is mainly composed of four elements: finance, science and technology, transportation and education. In the case of Shenzhen-Hong Kong Youth DreamWorks in the Qianhai Shenzhen-Hong Kong Cooperation Zone, this study obtains the residents' views on the collaborative development of science and technology innovation, as well as the evaluation of the performance of the four major elements by questionnaire survey. This study will provide suggestions for the Greater Bay Area to further strengthen collaborative innovation and deepen mutual cooperation in the future development.

Keywords: Guangdong-Hong Kong-Macao Greater Bay Area (GBA), Regional Collaborative Innovation, Qianhai Shenzhen-Hong Kong Youth DreamWorks.

*Corresponding author

INTRODUCTION

In order to promote the better development of city-clusters in South East China, and to build a world-class bay area as the base of scientific and technological innovation, the CPC Central Committee and the State Council issued the Outline Development Plan for the Guangdong-Hong Kong-Macao Greater Bay Area in 2019 (Central Committee of the Communist Party of China & State Council, 2019). The plan aims at giving full play to the comprehensive advantages of Guangdong, Hong Kong and Macao, deepening the cooperation between mainland and special administrative regions, and building the Greater Bay Area into a world-class urban agglomeration and one of the world economic centers against the world's top Bay area. The Guangdong-Hong Kong-Macao Greater Bay Area (GBA) is mainly composed of nine cities, including Hong Kong, Macao, Guangzhou and Shenzhen. This paper studies how the cities in the GBA develop through cooperative innovation. We do not only develop and perfect the related theory of regional cooperative innovation development, but also provide policy suggestions to improve the level of regional cooperative innovation in the GBA.

It has been pointed out that because of the different proportions of industrial structure in the Pearl River Delta region, the unbalanced overall state of industrial spatial distribution, and the great differences between developed and underdeveloped cities, the collaboration between these cities has become an inevitable choice, so as to enhance the effect of industrial transformation and upgrading (Zhao, 2011). Due to the existing complex problems and situations, it is necessary for different players, including local governments, enterprises, colleges and universities to cooperate to promote industrial transformation and upgrading in the GBA (Rubach, 2013).

In the field of finance, Peng (2015) has done a research on financial cooperation between the Pearl River Delta and the Yangtze River Delta region, and found that the degree of financial connection between cities is not only affected by the distance between cities, but also by the administrative region. Therefore, to promote the development of regional finance towards integration, the government should strengthen the construction of regional financial system, market and infrastructure, as well as the regional cooperation in financial supervision to prevent risks.

Yan et al. (2019) analyzed the innovation ability of various cities in the Pearl River Delta region. They pointed out some issues in scientific and technological collaborative innovation in the Pearl River Delta region. Firstly, the level of scientific and
technological innovation varies greatly among the cities, which manifests in the restriction on the innovation ability of science and technology industry. Secondly, under the influence of higher education, the quantity and quality of scientific research talents in Guangzhou and Shenzhen are far superior to other cities. Finally, the distribution of scientific and technological innovation resources in the Pearl River Delta region is not balanced, and there is a disconnection between the transformation and application of innovation achievements.

Zhang & Wen (2017) had different point of views. They analyze the relationship between regional collaborative innovation, innovation performance and regional integration by constructing a variety of models. They suggested that the innovation resources in Pearl River Delta region should be used efficiently and fairly allocated. It is also important to strengthen the circulation of the innovation elements, which means to transfer the endogenous driving forces which play a small role in Guangzhou and Shenzhen to other prefectural cities. As a result, it would improve the utilization rate of innovation elements and enhance the cooperative innovation ability of the surrounding cities, so as to promote the development of prefecture-level cities.

Despite the heated debates with various angles of points on this field, there are few discussions in the perspectives of the GBA residents towards the collaborative innovation of this area, who are the major actors and get mostly influenced by the relevant policy and development. In this study, we are going to analyze the case of Shenzhen-Hong Kong Youth DreamWorks in Qianhai Shenzhen-Hong Kong Cooperation Zone, so as to understand the major transformations brought by the GBA collaborative innovation. Then we collect the comments from the residents of GBA. As a supplemental angle of points to the former studies, the GBA residents’ evaluations are valuable for us to understand the effects and defects of the collaborative innovation. It also contributes to the suggestions to promote the policy and strategy in the construction and collaboration of the GBA, which forms the last part of this paper.

CASE SELECTION AND ANALYSIS

Case Selection and Background

In this paper, Shenzhen-Hong Kong Youth DreamWorks in Shenzhen Qianhai Shenzhen-Hong Kong Cooperation Zone is selected as the case study, and suggestions are provided for the construction of the Greater Bay Area from the experience of collaborative innovation in Qianhai Shenzhen-Hong Kong Cooperation Zone. Qianhai Shenzhen Hong Kong Cooperation Zone is also called Qianhai Shenzhen-Hong Kong Modern Service Cooperation Zone (hereinafter referred to as “Qianhai”) (Zhong & You, 2019). Qianhai located at the junction of Nanshan District and Bao'an District of Shenzhen, that is, the west of Nanshan Peninsula and the east side of Lintin, covering an area of about 15 square kilometers. Qianhai was established according to the “Overall Development Plan of Qianhai Shenzhen-Hong Kong Modern Service Cooperation Zone” approved by the State Council in 2010. With the experience of development and construction in Shenzhen and Hong Kong, Qianhai exerts its unique advantages in design planning, system and mechanism, operation and management, etc., and has carried out various exploration and innovation, which has promoted the development of Shenzhen and even the Pearl River Delta region.

Case Analysis

Through summarizing the research of incubator service, this paper analyzes the services provided by Shenzhen-Hong Kong Youth DreamWorks including policy support, management structure, human resources, entrepreneurial support, life service, financing support and legal support.

In Qianhai Shenzhen-Hong Kong Cooperation Zone, Shenzhen and Hong Kong have carried out industrial cooperation, talent cooperation and rule of law cooperation in various aspects. Shenzhen-Hong Kong Youth DreamWorks (hereinafter referred to as "DreamWorks") is one of these cooperation projects. DreamWorks is a public welfare platform which assembled Shenzhen and Hong Kong's various advantages of resources to support and cultivate Hong Kong and Macao youth innovation and entrepreneurship. It is able to accommodate more than 150 entrepreneurial enterprises, including the field of mobile cultural creativity, the Internet and intelligent hardware. DreamWorks, with the concept of "innovation-oriented international maker community", has created a unique ecosystem of innovation and entrepreneurship. The ecosystem includes the normal operation coordination mechanism of Shenzhen and Hong Kong, as well as six platforms and eight full-chain entrepreneurial service systems, which includes entrepreneurial services, incubator clusters, think tanks, investment and financing, publicity and promotion, and international roadshow centers. These platforms have eight functions: work, exchange, training, service, display, financing, fitness and residence.

Support from professional management and service institutions

DreamWorks has set up a professional service and management organization, that is, DreamWorks Division, which provides the youth of Shenzhen, Hong Kong and Macao a series of consulting and management services such as entry, office space, policy facilities, financing, law, etc. It also conducts supervision and management of the operation activities of the enterprises in the park to assist the industrial and commercial departments, tax departments and other state departments.
Talent introduction and support

In addition to the unified new talent rental and living subsidy policy in Shenzhen, DreamWorks has also formulated a "Peacock Plan" for top talents, which sets standards to classify all kinds of talents and provides certain incentive subsidies to the identified talents.

Support for entrepreneurship

DreamWorks provides some support for individual makers, creators teams and enterprises entrepreneurship project which has been applied and recognized. At the same time, DreamWorks will also give a certain funding to encourage all kinds of organizations to provide public welfare training, consulting, R & D and promotion services.

Support for living and working facilities

DreamWorks provides all kinds of working hardware and software facilities for entrepreneurs, and also creates a "YOU+ youth entrepreneurial district" in the aspect of life service in order to provide clean and comfortable talent apartments, delicious restaurants and convenience stores for entrepreneurs in Shenzhen, Hong Kong and Macao and to solve the problems in the life of entrepreneurs. At the same time, DreamWorks makes reasonable plans in traffic routes, bus stops and direct buses to solve travel problems.

Investment and financing support

Based on the advantages of Qianhai financial industry, DreamWorks offers a roadshow platform for entrepreneurs to invest and finance, so that entrepreneurs can better obtain funds for innovative entrepreneurship undertakings. In addition, the settlement of a large number of high-quality Hong Kong and Macao enterprises have a positive impact on funds raise of young people in Shenzhen, Hong Kong and Macao.

Legal support

DreamWorks has created the Shenzhen Customer Legal Service Center, which is the first comprehensive platform to provide one-stop legal services for entrepreneurs. Entrepreneurs can obtain legal advice and assistance through online Internet platforms and offline legal centers. In addition, Shenzhen Makers Law Center also set up a comprehensive platform for creators to connect with law firms, accounting firms, intellectual property protection agencies and other related institutions to provide corresponding rights and interests protection.

Purpose and Form of the Study

This empirical study adopts the method of a questionnaire survey, which is about the expectations and suggestions of the Greater Bay residents for promoting the development of the GBA regional collaborative innovation. The purpose of the study is to explore the ways of the GBA regional collaborative innovation development from the perspective of residents.

Questionnaire Design

Referring to the relevant regional collaborative innovation materials (ÓhUallacháin & Kane, 2015), as well as some psychological questionnaires, this questionnaire designed a total of 15 questions. The content can be divided into three parts, the first part is the personal related information survey, the second part is the most important part of the questionnaire and the third part is an optional essay question. The design of the questionnaire refers to "cognitive model", that is, "What, How, Why". Firstly, it discusses the nature of things, and then it studies how and why to do so. This questionnaire design starts from the GBA residents' understanding of the construction of the Greater Bay Area, and then collects suggestions for the development of cooperative innovation, so as to obtain the direction of cooperative innovation development in the Greater Bay Area.

In the first part, there are five questions, which mainly investigate the basic characteristics of residents, including age, sex, education, income and occupation. From these basic indicators, the cognition and preference of the group on the development of collaborative innovation in the Greater Bay Area are analyzed.

The second part has 9 questions, mainly from three dimensions of content design. First of all, this study investigates the residents' attitude towards the cooperative innovation and development of the Greater Bay Area. Secondly, based on the results of the case study above, we analyze the influencing factors, cooperation fields and participants of regional collaborative innovation development, and apply the results to the questionnaire so that the residents’ attitudes and preferences towards the relevant factors of regional collaborative innovation can be investigated. Finally, the study investigates the possible impact of regional collaborative innovation on residents' lives and gives corresponding suggestions.

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The third part has only one essay question, which is designed to collect the suggestions from the respondents for the development of collaborative innovation in the Greater Bay Area.

According to the psychology of the people who fill in the questionnaire, the seriousness of filling out the first half is higher than that of the second half, so we put the main part of the questionnaire that needs more thinking on the first page of the questionnaire, and the second page includes the first part and the third part.

Data Collection

The data collection of the questionnaire was conducted in the form of online questionnaire, and the data was collected by forwarding WeChat friends and WeChat Moments. A total of 283 questionnaires were collected, of which 283 were valid. After the data collection, the author exported the relevant data powered by www.wjx.cn, and uses the SPSS statistical software for analysis.

Analysis of Findings

Reliability analysis

Reliability analysis (Ho, 2006) is an effective analysis method to evaluate the reliability of comprehensive evaluation system. Cronbach's $\alpha$ coefficient reliability analysis was used in this questionnaire. The value of Cronbach's $\alpha$ coefficient is between 0 and 1, and the closer the value is to 1, the higher the internal reliability of the scale is. When the number of items is definite, if the Cronbach's $\alpha$ coefficient is greater than or equal to 0.9, the internal reliability of the scale is considered to be high; If the Cronbach's $\alpha$ coefficient is 0.7$\leq$$\alpha$$<0.9$, the internal reliability is considered to be high or acceptable; If the Cronbach's $\alpha$ coefficient is between 0.6 and 0.7, the design of the scale is considered to be problematic but still has reference value; If the Cronbach's $\alpha$ coefficient is less than 0.6, the design of the scale is considered to be problematic and should be redesigned.

According to the reliability analysis of the above analysis method, the results are as shown in Table 1. It can be seen that the $\alpha$ coefficient of the study scale is 0.908$>0.9$, so it can be concluded that the internal reliability of the questionnaire is high and the design of the scale is reliable.

<table>
<thead>
<tr>
<th>Clonbach's $\alpha$</th>
<th>0.908</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clone Bach Alpha Based on Standardization Terms</td>
<td>0.922</td>
</tr>
</tbody>
</table>

Validity analysis

Validity analysis is a method to evaluate the effectiveness and accuracy of questionnaire design. KMO test and Bartlett's test were used in this questionnaire. In the analysis, if the value of the KMO test is greater than 0.7 and the probability P value of the Bartlett's test is less than 0.05, it indicates that the questionnaire has good structural validity.

According to the above analysis method, the validity analysis is carried out and shown in Table 2 below. It can be seen that the KMO value is 0.889 $>0.7$, and the bartlett sphericity test value is $0 < 0.05$, indicating that the questionnaire has good validity and accuracy and good structural validity.

<table>
<thead>
<tr>
<th>KMO sampling fitness</th>
<th>0.889</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test of Bartlett's Spherical Shape</td>
<td>0.000</td>
</tr>
</tbody>
</table>

Basic descriptive statistical analysis

The basic descriptive statistical analysis of the sample includes six indicators: age, sex, education level, monthly income, occupation and city. A total of 283 questionnaires were collected. The basic description of the statistical results is shown in Table 3 and Figure 1 below. Based on the comprehensive analysis of the results of this questionnaire, the characteristics are as follows: (1) the age distribution is mostly between 18 and 25 years old, which accounts for a large number of people; (2) Female investigators are more than male; (3) Most of the investigators have junior college or bachelor’s degree; (4)
monthly income is mostly below 5000 yuan, followed by 5001 yuan to 10000 yuan; (5) More than half of the survey respondents are students, followed by the enterprise staff; (6) Most of the respondents live in Shenzhen.

Table 3: Statistical tables for basic descriptions.

<table>
<thead>
<tr>
<th>Statistical variables</th>
<th>Number of people</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-25 years</td>
<td>223</td>
<td>78.8</td>
</tr>
<tr>
<td>26-35 years</td>
<td>35</td>
<td>12.4</td>
</tr>
<tr>
<td>36-45 years</td>
<td>13</td>
<td>4.6</td>
</tr>
<tr>
<td>Over 46</td>
<td>12</td>
<td>4.2</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>105</td>
<td>37.1</td>
</tr>
<tr>
<td>Female</td>
<td>178</td>
<td>62.9</td>
</tr>
<tr>
<td>Cultural level</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior high school and below</td>
<td>5</td>
<td>1.8</td>
</tr>
<tr>
<td>Secondary or high school</td>
<td>25</td>
<td>8.8</td>
</tr>
<tr>
<td>Junior college or undergraduate</td>
<td>229</td>
<td>80.9</td>
</tr>
<tr>
<td>Graduate and above</td>
<td>24</td>
<td>8.5</td>
</tr>
<tr>
<td>Monthly income</td>
<td></td>
<td></td>
</tr>
<tr>
<td>RMB5000 or less</td>
<td>197</td>
<td>69.6</td>
</tr>
<tr>
<td>RMB5001 to RMB10000</td>
<td>49</td>
<td>17.3</td>
</tr>
<tr>
<td>RMB10001 to RMB15000</td>
<td>15</td>
<td>5.3</td>
</tr>
<tr>
<td>RMB15,000 and above</td>
<td>22</td>
<td>7.8</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Students</td>
<td>188</td>
<td>66.4</td>
</tr>
<tr>
<td>Staff of organs and institutions</td>
<td>8</td>
<td>2.8</td>
</tr>
<tr>
<td>Enterprise staff</td>
<td>39</td>
<td>13.8</td>
</tr>
<tr>
<td>Professional and technical staff</td>
<td>8</td>
<td>2.8</td>
</tr>
<tr>
<td>Self-employed</td>
<td>8</td>
<td>2.8</td>
</tr>
<tr>
<td>Service Industry Personnel</td>
<td>7</td>
<td>2.5</td>
</tr>
<tr>
<td>Freelance</td>
<td>8</td>
<td>2.8</td>
</tr>
<tr>
<td>Other</td>
<td>17</td>
<td>6.0</td>
</tr>
</tbody>
</table>
Cognitive analysis

At the beginning, the questionnaire firstly found out the surveyor’s understanding of the construction of the GBA. The results are shown in Table 4 and Figure 2. It can be seen from the results that most residents of the Greater Bay Area still have some understanding of the policies and measures adopted by the central government to demarcate the GBA, but most residents only have a little understanding. Therefore, the government could increase publicity and popularize relevant policies among residents, thereby enhancing residents’ initiative in building the Greater Bay Area.

Table 4: Analysis of residents' perception of the Greater Bay Area.

<table>
<thead>
<tr>
<th>Did you know that the central government divides the Guangdong-Hong Kong-Macao Greater Bay Area?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>248</td>
</tr>
<tr>
<td>No (skip the next question)</td>
<td>35</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How much do you know about the construction of the Greater Bay Area?</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Know well</td>
<td>20</td>
</tr>
<tr>
<td>Better understand</td>
<td>33</td>
</tr>
<tr>
<td>Understand a bit</td>
<td>101</td>
</tr>
<tr>
<td>Know but don't know much</td>
<td>72</td>
</tr>
<tr>
<td>Don't understand</td>
<td>22</td>
</tr>
</tbody>
</table>

Figure 1: Urban distribution.
Perception analysis

From the above case analysis, it is concluded that regional collaborative innovation is often carried out in the fields of finance, technology, transportation, and education (Tucker, 2008). The survey results are shown in Figure 3. The results of the questionnaire survey are consistent with the results of the case analysis. It can be seen that in the process of collaborative innovation and development in the Greater Bay Area, attention should be paid to the above mentioned four fields. Among them, taking the average value, the largest value is technology and transportation, which are 5.30 and 5.23 respectively. The higher the average value, the more importance the residents attach to it. Therefore, the top priority of the collaborative innovation and development of the GBA is technology and transportation.

Figure 2: Residents' support for the construction of the Greater Bay Area.

Figure 3: Analysis of the fields of regional collaborative innovation.
The Figure 4 shows the degree of influence of different factors on regional collaborative innovation considered by residents of Guangdong, Hong Kong and Macao. From the survey results, it can be seen that the development of regional collaborative innovation is affected by many factors. Among them, policy, transportation, technological level, and economic development have the greatest influence on the development of regional collaborative innovation, followed by residents' educational level and consumption level. Among them, the policy with the largest average value is 5.27, indicating that the design of superstructures and policy guidance play a key role in regional collaborative innovation and development.

Therefore, the government should listen to the opinions and suggestions of all parties and formulate comprehensive policies to provide guidelines for the construction of the GBA. The development of regional collaborative innovation requires the participation of multiple subjects. Here we investigate the residents' preference for the degree of dominance of each subject. The results are shown in Figure 5. Residents generally believe that the government should play a leading role in the development of regional collaborative innovation, followed by enterprises and universities. This reflects the residents' support and dependence on the government to a certain extent. The results show that the government should play its leading role and guide all entities to actively and orderly participate in the construction of the GBA.

During the construction of the Greater Bay Area, all aspects of residents' lives will be affected. The survey results are shown in Figure 6 and Figure 7. According to the average results, transportation has the greatest impact on life, followed by work, and then the use of technology products. This shows that residents believe that the construction of the Greater Bay Area is conducive to promoting the construction of transportation facilities, shortening the travel time between cities, and improving the convenience of residents' travel. In the process of gradual improvement of basic transportation facilities in the Greater Bay Area, residents of the GBA believe that work methods and locations may also change accordingly. At the same time, residents believe that the regional collaborative innovation of the Greater Bay Area will promote the development of science and technology, thus affecting residents' use of technology products.
Regional construction will more or less cause certain problems. Here we investigate residents’ attitudes towards possible problems. The results of the survey are shown in Figure 8. Residents believe that the most likely problem is uneven regional development, followed by corruption. Therefore, during the construction of the Greater Bay Area, the government should pay attention to the problem of uneven regional development. At the same time, the government should strengthen the supervision during the construction process, regulate and restrict the operation procedures of various projects, prevent corruption from occurring, and take certain punishment measures against illegal personnel.
In addition, a question-and-answer question was set up at the end of the questionnaire for residents to fill in suggestions for collaborative innovation and development in the Greater Bay Area. The suggestions of comprehensive investigators mainly include the following:

1. Set up a broad framework for development and construction and unify policy guidelines.
2. Establish a working group involving Guangdong, Hong Kong and Macao to strengthen communication.
4. Strengthen talent exchanges and introduce domestic and overseas high-end talents.
5. Introduce advanced technology and strengthen intellectual property protection.
6. Strengthen regional communication, resource sharing and win-win cooperation.
7. Encourage regional entrepreneurial cooperation in the Greater Bay Area.
8. Pay attention to the cultural differences between Guangdong, Hong Kong and Macao, and make relevant coordination.
9. Strengthen the construction of local infrastructure such as medical care and education.
10. Pay attention to hygiene management and public security management in the development process.

CONCLUSIONS AND IMPLICATIONS

Conclusions

The construction of Guangdong-Hong Kong-Macau Greater Bay Area is of great significance. For China, it is not only a pilot area for China to deepen the achievements of reform in an all-round way, but also a key bay area for building a world-class international urban cluster. This study adopts two methods: case analysis and questionnaire. The case analysis method obtains the relevant development and construction experience by studying the existing cooperative innovation cases in the Greater Bay Area, while questionnaire method obtains residents’ suggestions and preferences for the construction of Greater Bay Area. Combining the two methods, this study gives guidance for the development and construction of the Greater Bay Area based on the public opinion. This study still has some limitations. Some influencing factors and practical problems of regional collaborative innovation may not be fully examined. In terms of the questionnaire survey, most of the research samples are aged between 18 and 25. Also, most of the investigators are students, and with a junior college or bachelor degree or above. As the construction of the GBA is still in its early stage, in the future, in-depth research should be conducted to find out effective ways for the development of the Greater Bay Area.

Managerial Implications for Electronic Business

Collaborative innovation and development of the GBA is conducive to building an efficient cross-regional e-commerce platform, which will facilitate in-depth cooperation and resource exchange between regions, improve the efficiency of personnel flow and logistics as well.
Under the background of collaborative innovation and development of the GBA, small and medium-sized enterprises (SMEs) will be benefit from the emergence of more innovative financing modes, especially the online modes. These innovative financing modes will also stimulate the enthusiasm and initiative of SMEs to participate in inter-regional e-commerce cooperation.

In terms of science and technology, collaborative innovation of the GBA will continuously promote the application and development of emerging technologies such as 5G and blockchain in e-commerce activities. In the process of developing new e-commerce modes, the coordination of the development of science and technology in the GBA will also be promoted. With the jointly building of transportation in the GBA, geographically isolated areas can be effectively connected, providing necessary and convenient support for personnel flow and logistics between regions, and constantly improving the efficiency of cooperation and exchange.

Through the collaboration of education, the shared talent platform of the GBA could facilitate the allocation of senior talents in the enlarged human resource market, especially those in the service industry and universities from Hong Kong and Macao, which would help to flourish the development of advanced service industry in the GBA.

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