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One country with two systems: The characteristics and development of higher education in the Guangdong–Hong Kong–Macau Greater Bay Area

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The creation of bay areas is one way to develop economies and culture based on natural characteristics and regional connections; successful examples include the San Francisco, New York and Tokyo Bay Areas. In 2019, China established the Guangdong–Hong Kong–Macau Greater Bay Area (GBA). As a result of historical and geographical factors, the GBA is uniquely characterised by being subject to ‘one country, two systems’, ‘three customs territories’, and ‘three legal systems’. This study offered ample empirical evidence based on qualitative methods referring to in-depth interviews with academics and managers as well as publicly available policies and literature in the GBA. A thematic analysis was used to explore the context and characteristics of developing higher education (HE) in the GBA. The study emphasised that developing GBA’s HE improved its partnerships from co-operation to strategic co-ordination to resource sharing. This research contributes to HE and its governance in the GBA, a topic on which there is limited information in the extant international research literature. It is also useful to policymakers and scholars as it provides potential strategies and insights regarding the development of regional higher education.

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Introduction

A bay area is a set of connected regions located around the sea or rivers (Yang et al., 2019). In addition to their natural characteristics, bay areas endow regional collections with social significance; that is, such regions share specific social attributes, such as economy, culture, technology, and education (Lu and Zhuo, 2020). Over the past several decades, some city clusters have developed into international bay areas as a result of social, economic, political, and other factors, in particular the San Francisco Bay Area, New York Bay Area, and Tokyo Bay Area (Yang et al., 2019). Regarding higher education (HE), the universities in each of these three international bay areas have collaborated and integrated in terms of university resources and organisational management respectively which has greatly improved their HE development (Li et al., 2020).

Since the return of Hong Kong and Macau to China in 1997 and 1999, respectively, the Chinese government has enacted a number of policies to deep their cooperation with other cities on the Chinese mainland. In 2019, the State Council published the *Outline Development Plan for the Guangdong–Hong Kong–Macau Greater Bay Area*. This document emphasises that the development of the GBA is an attempt to foster a new unique pattern of all-round opening-up. Its aim is that the GBA will become a world-class city cluster by 2035 through supporting regional integration and the Belt and Road Initiative (a Chinese global initiative of cooperative development between China and the countries along the Belt and Road with the goal of building economic and cultural partnerships and political mutual trust). The GBA is characterised by ‘one country, two systems’, ‘three customs territories’, and ‘three legal systems’ as a legacy of the historical, geographical, and cultural background of the area. ‘One country, two systems’ means that under the premise of one China, mainland China adheres to the socialist system, while Hong Kong and Macau maintain their capitalist system for the foreseeable future (State Council Information Office of China, 2014); ‘three customs territories’ and ‘three legal systems’ refers to the three different customs areas and legal systems of Guangdong, Hong Kong and Macau and their three different currencies (Chinese Yuan, Hong Kong Dollar, and Macau Pataca).

As shown in Fig. 1, the GBA has four major cities, Hong Kong, Macau, Guangzhou and Shenzhen, and another seven affiliated cities located in Guangdong Province— covering a total area of 56,500 km² and with a resident population of around 86 million as of 2020 (HK Government, 2020). In 2020, the Ministry of Education and the Government of Guangdong Province published a *Plan for the Development of HE Cooperation in the GBA*. The *Plan* stated that the developmental goal of HE in the GBA is to build a number of world-class universities which will play an important part in achieving the goal of becoming a world-class city cluster as well as an international talent and innovation hub.

The development of HE and regional economies complement each other. Recently, some studies have begun to concentrate on HE issues in the GBA. For example, Chen and Chen (2019) suggested that HE in the GBA needs to be integrated and innovative, with multiple centres, while others have researched HE cooperation between the cities of the GBA from the perspective of regional development (Li et al., 2020; Lu and Zhuo, 2020; Xu and Guo, 2019). Compared with the other main bay areas in the world, the GBA is distinct in its different social ideology and cultural contexts (Li and Yuan, 2019). While these studies provide plentiful information on the development and challenges confronted by HE in the GBA, most are published in Chinese and lack empirical support; only a few studies in English are available. This study aims to elaborate on the characteristics and development of HE in the GBA, contributing to GBA’s HE and its governance. The research provides valuable information and insights to supplement international literature in the GBA. It is also significant for policymakers and scholars to formulate and enhance the strategies for developing regional HE.

What are the characteristics of HE in the GBA? What are the challenges it faces? How might it develop? This paper systematically explores the above questions in empirical ways, reviewing all extant Chinese studies about HE in the GBA and a small number in English and interviewing relevant academics and managers. It first reviews the current policies and literature regarding HE relating to the GBA before addressing the research

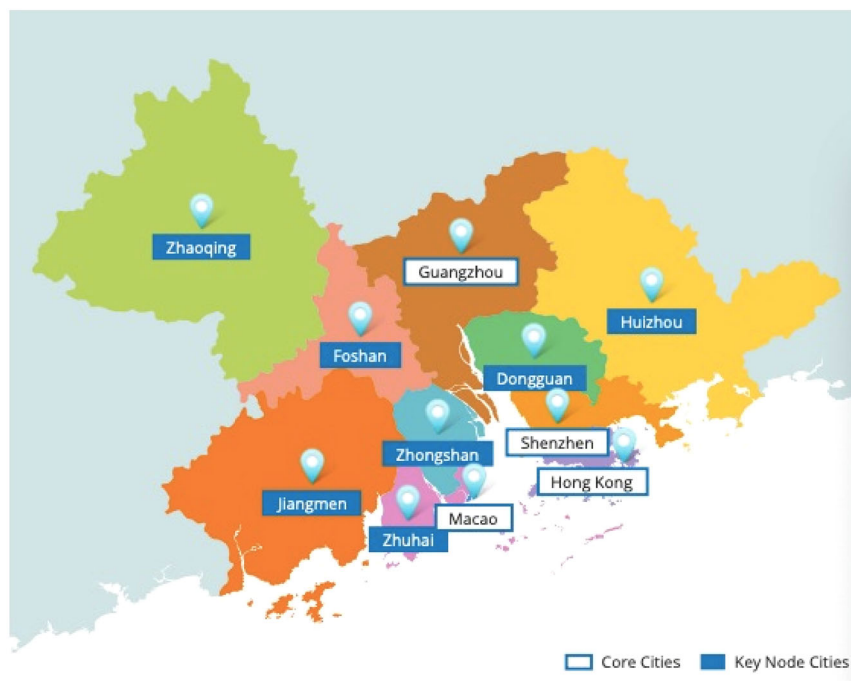


Fig. 1 Cities in the GBA. Map based on Gov HK (2021).

Table 1 Major economic indicators of the four bay areas (developed by Hong Kong Trade Development Council Research, 2020).

	Greater Bay	San Francisco	New York	Tokyo
Area (sq. km)	56,098	17,887	21,479	36,898
Population(mn)	86.17	7.74	19.22	44.34
GDP/trillion US\$	1.679	1.00	1.86	1.99
GDP per capita US\$	23,116	128,573	96,853	45,084
Tertiary industry share %	66.1	75.0	82.4	75.9
No. of QS Top 100 universities in 2021	5	3	13	2
No. of top 500 enterprises	25	22	28	60
No. of cities	11	9	31	4

methods and presenting the empirical findings. This is followed by a section of discussion and conclusion.

Literature review

Construction of the Bay Area and the GBA. The San Francisco, New York, Tokyo, and Guangdong–Hong Kong–Macau Bay areas are the four largest in the world (Liao, 2020). The Tokyo Bay Area is basically a metropolitan area surrounding Tokyo, which can be regarded as a single-core-driven model (Chen and Chen, 2019). The New York Bay Area takes New York as its financial centre and Boston as its cultural and educational centre; thus, it is a dual-core-driven regional development model. The San Francisco Bay Area has a decentralised pattern consisting of many cities in the industrial belt of Silicon Valley, with no clear distinction between them (Chen and Chen, 2019). These bay areas also differ quite dramatically in the number of cities they encompass. However, when compared with the other three, even though the GBA has the most extensive area and population, it had the lowest tertiary industry share and per capita GDP of the four in 2020 as shown in Table 1.

The San Francisco Bay Area has a world-class university cluster including Stanford University and the University of California (UC), Berkeley as well as a number of renowned high-tech laboratories and an established industry-university-research cooperation model. The New York Bay Area has several elite ‘Ivy League’ universities such as Harvard, Yale, and Columbia. The Tokyo Bay Area includes eminent HE institutions such as the University of Tokyo, with other universities forming a university cluster in Japan. In the GBA, five Hong Kong universities ranked in the top 100 QS 2021 university rankings (Quacquarelli Symonds, 2021). The participation of Hong Kong’s science and technology talents and universities could take an important role in realising China’s ambition to become a global technology power (Tang, 2022). Moreover, the study by Xie et al. (2021) demonstrated that the development of the GBA is a breeding ground for economic possibilities and evidence-based policies to foster internationalised academic research enterprises.

The subject of the GBA has been discussed for over 20 years: as early as 1994, Wu Jiawei, the former president of the Hong Kong University of Science and Technology, proposed establishing a city agglomeration similar to the San Francisco Bay Area (Zeng, 2019). This can be regarded as the original proposal for China’s GBA. At the beginning of the 21st century, Nansha Port in Guangzhao, the capital city of Guangdong Province, was first identified as a potential site to replicate the Tokyo Bay area of Japan. In 2009, the governments of Guangdong Province, Hong Kong and Macau agreed to develop the GBA as a critical focus for establishing cross-border regional coordination (Planning Department Strategic Planning Section of HK, 2009).

According to the State Council (2016), the idea of a city cluster in Southern China was included in China’s 13th Five-Year Plan (2016–2020) and, in 2017, the central government announced

plans to develop a city cluster in the GBA. In the same year, the *Framework Agreement on Deepening Guangdong–Hong Kong–Macau Cooperation in the Bay Area* was jointly signed by the governors of the three places in the presence of Chairman Xi in Hong Kong (Xinhua News, 2017). This was an essential milestone in the development of the GBA as it demonstrated that both the central government and local ones agreed on its construction and development. Two years later, the *Outline Development Plan for the Guangdong–Hong Kong–Macau Greater Bay Area* was published (State Council, 2019) which has since been used as the definitive guide for developing the GBA.

As shown in Fig. 2, China has experimented elsewhere with regionally integrated areas for development purposes including the ‘Beijing–Tianjin–Hebei Economic Circle’ (National Development and Reform Commission, 2019), the ‘Yangtze River Delta Agglomeration’ (State Council, 2020), ‘Chengdu–Chongqing Twin-City Economic Circle’ (National Development and Reform Commission, 2011), and ‘Yangtze River Middle Reaches Urban Agglomerations’ (National Development and Reform Commission, 2015). The integrations of these coordinated development areas are mutually reinforcing and jointly promoting high-quality economic growth in China (Liaison Office of Hong Kong, 2021). For instance, in the Yangtze River Delta Agglomeration, regional collaborative integration has significantly encouraged the innovative and sustainable development of Jiangsu and Zhejiang provinces and Shanghai (Wu et al., 2021). Based on the extant experiences, the national strategy of the construction of the GBA as a city cluster is an important component in coordinated regional development in China.

In order to become an internationally influential technology and innovation centre, the GBA embraces the ‘multi-core and multi-centre’ model in which Hong Kong is a financial centre for a more competitive international metropolis, Macau is a world-class tourism and leisure centre, Shenzhen is a high-tech centre for innovation and creativity with global influence, and Guangzhou is an international business, education and cultural centre (State Council, 2019). These four centres have been designated as the engine for the coordinated development of the region. Their development will help promote the construction of the ‘Guangzhou–Shenzhen–Hong Kong–Macau’ technological innovation corridor as well as the integration of technologies, talents, knowledge, and resources in various ways (Liao, 2020). This driven model of the GBA is unique in how the four core cities act as engines for promoting regional development and HE, aiming to build a cluster of world-class universities and becoming a global centre of science, technology and innovation (Xu and Guo, 2019).

HE for regional development. Knight (2012) defines the regionalisation of HE as a process of establishing closer cooperation and alliance between HE sectors. He believes that the functional, organisational and political approaches (FOPA) model has, as its name suggests, three paths that complement each other

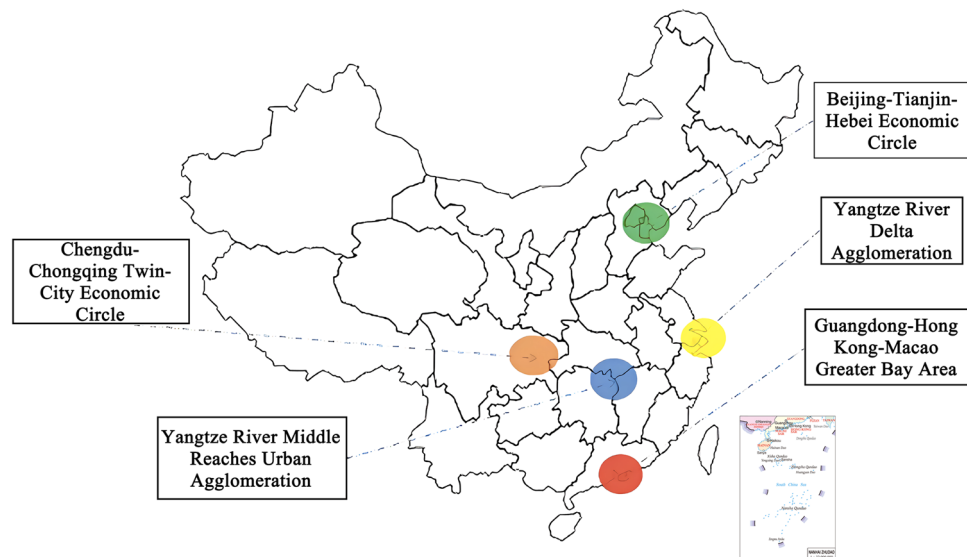


Fig. 2 Four coordinated development areas and the GBA in China. Map based on Ministry of Nature Resources (2019).

(Knight, 2016). Specifically, the functional pathways are a set of strategies (e.g., student mobility and cross-border cooperation programmes) to promote regional HE development; organisational paths depend on governmental and non-governmental organisations to establish systematic guidance for the development of HE regionalisation; and political paths refer to making political statements to formalise the development of HE regionalisation, such as development outlines and agreements (Knight, 2016). This functional approach suggested the development of the HE guarantee system which includes many indicators, in particular, a quality assessment platform and a reasonable frame of reference in the specialised region (Knight, 2012). Recently, some scholars have adopted the FOPA model to study regional HE in places such as South America and Arab states (Vitarelli Batista, 2021; Jafar and Knight, 2020). Qin (2021) also used this FOPA model to analyse the quality assurance system of HE in China. Undoubtedly, the GBA is an important region in southeast China and the development of its HE sector has been identified as a regional strategy (State Council, 2019). In the FOPA model, various actors and stakeholders are embedded in the HE regionalisation procedures. The development of the HE sector in the GBA can be seen as the interaction centre in the FOPA model for HE regionalisation. In this regard, the functional, organisational, and political factors jointly play crucial roles in promoting competitiveness in regional HE.

Another view of the role that HE plays in regional development is the triple helix. In the triple helix of university–industry–government relations, university and industry are two relatively independent and distinct institutional fields. The government offers incentives to encourage academic institutions to go beyond their traditional functions of cultural memory, education, and research to directly contribute to the knowledge economy; more importantly, governments are also changing their relationships with economic institutions, becoming both more and less involved (Etzkowitz and Leydesdorff, 1997). Since science and technology are essential to generate welfare in this knowledge-driven society, universities have become a priority for social development.

In fact, universities are a major driver of innovation; for example, universities such as Stanford and UC Berkeley in the San Francisco Bay Area interact with government and industry in their roles in the business ecosystem, creating new job opportunities and promoting sustainable development in the long term (Piqué et al., 2021). The dynamic developments in

Silicon Valley in the San Francisco Bay Area rely not only on the existence of prestigious universities, but also on how they interact and overlap with the other agents of the triple helix model, finding common strategic goals, and accepting that none of them can adequately handle the complex, interdisciplinary and cutting-edge problems alone (Kimatu, 2016). Stanford University is closely connected to the emerging technology industry in the region, while UC Berkeley has traditionally had a closer relationship with the government; however, with a reduction in state government support, UC Berkeley is also expanding its cooperation with industry (Piqué et al., 2021).

As well as their traditional roles of teaching and research, universities and other HE institutions can do more to support regional development (Goddard et al., 2016). An improved tripartite relationship between universities, industries and governments would benefit regional development. For instance, if HE institutions invested more in entrepreneurship education, high value-added activities from the state's office of technology transfer would increase. In addition, if the interaction between universities and investors grows, the relevant infrastructure used to incubate and accelerate business ideas might be boosted accordingly (Piqué et al., 2021). Therefore, universities not only promote economic and technological output in the region they are in but also, to some extent, guide the capitalisation of talents (Shattock, 2009), as happened in San Francisco. After that reflection, the characteristics for developing regional higher education in GBA are necessary for further discussion.

Methodology. Documentary analysis and interviews were used for the data collection. The first step was to review and extract the relevant information from published papers and official documents. The latter was released on official websites by governmental departments such as The State Council, the Ministry of Education, the Government of Guangdong Province, the Hong Kong Special Administrative Region (SAR), and Macau SAR. As the *Outline Development Plan for the GBA* was issued by the State Council in 2019, the date search parameters were set primarily for 2019 to 2021. Keywords and phrases such as 'Greater Bay Area', 'HE policy in China', 'four Bay Areas worldwide' and 'Chinese HE governance and strategies' were used to retrieve information from databases including China National Knowledge Infrastructure (CNKI), Chinese Journal Full-text Database, China

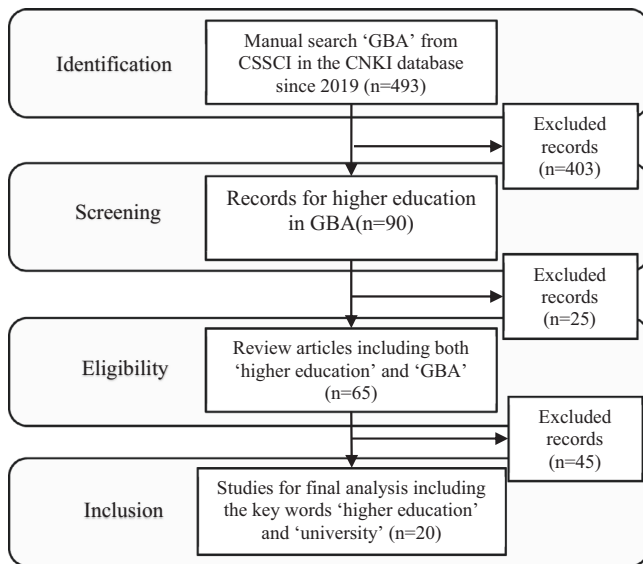


Fig. 3 The search process of Chinese literature in CNKI. Framework based on De los Reyes et al. (2021).

Education Database, Google Scholar, and the Hong Kong University library. Following the research questions, this study analysed both Chinese and English documents to elaborate on the opportunities and challenges of HE in the GBA as well as to explore how the GBA could use the practical experiences of the three other international Bay Areas to promote the development of its own HE institutions.

A total of 92 texts from relevant governmental policies and the official websites of nine Chinese mainland cities, Hong Kong and Macau, at the municipal, regional, and national levels were reviewed. Approximately two-thirds (65) of them covered 'HE', 'the innovation hub' and 'talent development'. In addition, Chinese articles and book chapters, along with the few English language sources referring to the GBA, were critically reviewed. Since the vast majority of studies on HE development in the GBA so far have been published in Chinese journals, few of them have been published in international journals. That was why most of the documentary data we reviewed and analysed were in Chinese. CNKI, an authoritative and mainstream Chinese academic full-text database, was used as the key database for searching scholarly articles. The initial search result yielded 493 articles since 2019 which included 'GBA' from the Chinese Social Sciences Citation Index (CSSCI) in the CNKI database, 90 of which related to HE recorded, with 65 including both 'HE' and 'GBA' thus qualifying for full-text review. Searching the theme of 'GBA' with the keywords 'HE' and 'university' presented 20 studies for focus analysis. Figure 3 summarises the search strategy and process.

After collecting the available text materials, raw data from interviews (Englander, 2012) was needed to understand the HE development features and challenges in the GBA. Suitable participants were accessed through snowball and purposive sampling strategies with maximum variation to gain abundant information. In this way, we carefully considered the diversity of the academics' demographic information, such as gender, age, working place, academic position, and administrative duty, to comprehensively understand the research questions. Although there are many HE institutions in the GBA, we aimed to examine academics' perceptions and insights individually rather than at an institutional level. This means that, besides documentary data, we focused more on the individual reflections and experiences of the scholars in the GBA. Thus, this study interviewed sixteen academics and managers who have worked in the field of HE in GBA and who understand its

Table 2 Participant profiles.

Coding ID	Position	Gender	Working place
A1	Assistant Professor	Male	Guangdong
A2	Associate Professor & Deputy Director of Academic Affairs Office	Male	Hong Kong
A3	Assistant Professor	Female	Guangdong
A4	Assistant Professor	Male	Hong Kong
A5	Professor & Head of Department	Male	Guangdong
A6	Professor	Female	Macau
A7	Associate Professor & Associate Head of Department	Female	Guangdong
A8	Professor	Male	Guangdong
A9	Assistant Professor	Female	Guangdong
A10	Professor	Male	Hong Kong
A11	Professor	Female	Guangdong
A12	Associate Professor & Associate Head of Department	Male	Hong Kong
A13	Assistant Professor	Male	Macau
A14	Professor	Male	Guangdong
A15	Associate Professor	Female	Guangdong
A16	Assistant Professor	Female	Hong Kong

development. Seven were female and nine male; the interviews took place face-to-face and using their mother tongue. This is beneficial to express and focus on individuals' inner opinions (Liu, 2018). We illustrated the informant's working place because the HE systems differ in three places: Guangdong, Hong Kong, and Macau. When quoting the interview with the informants, their workplace was also marked. Interview questions included: What do you think about developing your career in the GBA? Do you have any challenges at the university? What have been your experiences regarding cooperation with industry or government? What are the features of HE in the GBA in your opinion? The fieldwork was carried out from July 2021 to January 2022. Each interview usually lasted between 40 and 70 min with some follow-up conversations. All interviews took place in the participants' offices. Their profiles are given in Table 2.

Thematic analysis is a qualitative method that effectively analyses textual data from different sources (Tight, 2004). This is an important approach to describing the educational phenomenon through the themes within the research (Daly et al., 1997). It reveals the characteristics of the documents and interview contents, allowing for a better exploration of the research questions, whether through the analysis of a single text or a large number of text sets. Thus, this research used thematic analysis to explore the characteristics and challenges of developing HE in the GBA. The transcripts were translated into English and cross-checked to gain useful information for the research questions. In order to protect the interviewees' personal identities, we assigned them anonymous codes. The texts from interview transcripts, published policies, official media news, journal articles and books were extracted to generate correlative themes through Nvivo software (Table 3) to arrive at the findings. To be specific, we followed several stages (Xu and Zammit, 2020) to analyse the primary and secondary data. First, we fully familiarised ourselves with the data through reading, understanding and translating the transcripts and documents. Second, the initial codes were generated with the assistance of Nvivo software, and we searched the themes inductively. After that, each theme was reviewed independently to check the reliability of the coding frame. Finally, after internal discussions, the themes were defined and named. The results demonstrate that three themes were created with thirteen principal codes.

Table 3 Themes and codes defined from the data.

Themes	Codes
HE within one country and two systems	Cultural diversity Value differences One country, two systems Cooperation among universities
Imbalanced profile in quality and quantity of HE provision	Quality of HE Internationalisation of HE Inadequacy of internationalising HE Unbalanced development
Progressing partnerships from co-operation to strategic co-ordination to resource sharing	Sharing HE resources Cities of GBA City cluster World-class universities Strategic co-ordination

Characteristics and development of HE in the GBA

HE in one country with two systems. Compared with the three other bay areas where the development of HE took place within a single currency and legal system, that of the Greater Bay Area, which is subject to ‘one country, two systems’, ‘three legal systems’ and ‘three customs zones’, is more complex. Before Hong Kong and Macau were returned to China, their administrative sovereignty belonged to the Hong Kong and British governments, and the Macau and Portuguese governments, respectively, and followed their HE governance systems: both were in a loose state of independent development against a background of pluralistic sovereignty.

The GBA has special significance as, while it links the cities of the Pearl River Delta with Hong Kong and Macau in HE, each has different educational laws (Xu and Huang, 2019). For example, Macau’s HE law was promulgated in 1991 when it was still a Portuguese colony, yet it continued to be used for a further 18 years after Macau’s return to China in 1999. Hong Kong was returned to China in 1997, yet the colonial impact of British HE on Hong Kong society has not markedly weakened (Li and Yuan, 2019). The youth mainly received HE in Hong Kong and the UK instead of mainland China, resulting in a limited understanding of the Chinese national system and their sense of identity as Chinese (Chen and Ma, 2019). Despite this, there is a good foundation for mutual understanding and communication:

“Hong Kong and Macau are of the same origin and roots as mainland China. This means that even under the ‘two systems’, the three places have an inherent advantage in fostering cultural identity.” (A2, Hong Kong)

In terms of the university operation system, universities in Guangdong have relatively little autonomy. In comparison, the governments of Hong Kong and Macau SARs rarely intervene in the running of universities, and so they have considerable autonomy (Li and Yuan, 2019). In terms of educational resources, Guangdong universities’ educational funds mainly come from the government. Hong Kong universities obtain funding from the SAR government for their running costs, but they also have more external funding as well as charging high tuition fees. Some informants like A13 from Macau and A10 in Hong Kong agreed with the following statement:

“Our students’ tuition fees for undergraduate and post-graduate study at public universities in Guangdong Province are much lower than in Hong Kong and Macau, and our funds for research are mainly dependent on government support.” (A11, Guangdong)

Hong Kong and Macau were separated from mainland China for over 100 years and, during the long period of colonial rule,

their citizens had a weak sense of belonging to China. They were deeply influenced by western culture and values, so it may take many years for them to fully accept the culture and values of mainland China. Part of the promotion of the integrated development of HE in the three places is the enhancement of the national identity of Hong Kong and Macau citizens, that is, helping the citizens of the two places to psychologically recognise that they belong to the political community of China.

“For young people, there is a need for them to be well educated, such as by updating teaching material on self-identity with Chinese history and culture.” (A7, Guangdong)

In the past, the lack of overall and long-term planning was particularly evident in non-sustainable cooperation and exchange in the GBA, especially the shortage of government-led institutional arrangements. Some participants pointed out that the different cultural backgrounds and values mean that “higher education development within the GBA may face big challenges” (A5, Guangdong; A6, Macau; A10, Hong Kong; A12, Hong Kong). To become comparable with world-class universities, the GBA needs to strengthen the cooperation between and complementary advantages of Hong Kong, Macau, and the Guangdong cities in HE. How to implement national HE policies locally is an important component in the development of HE (Liu, 2018). The same goes for HE in the GBA. As a top-level policy design for HE, one of the aims of the *Plan for Promoting the Cooperation and Development of HE in the Guangdong–Hong Kong–Macau Greater Bay Area* (Ministry of Education and Government of Guangdong Province, 2020) is to strengthen cooperation between institutions and to build several world-class universities in the GBA. Two respondents noted that:

“In order to coordinate with the development strategy of the GBA, Hong Kong and Macau universities will have to improve their cooperation with mainland cities in Guangdong province in the GBA.” (A3, Guangdong; A5, Guangdong)

However, Qin (2021) notes that developing HE regionalisation in the GBA is not the same as the international integration that takes place in, for example, the European Union and ASEAN, or internal regional integration such as the ‘Beijing–Tianjin–Hebei Economic Circle’ and ‘Yangtze River Delta Agglomeration’ coordinated developments, because of the ‘one country, two systems’ and ‘three legal systems’ setting.

“The improved connection among the three places (Guangdong, Hong Kong and Macau) shall provide a new platform for the development of higher education in Hong Kong and Macau by taking advantage of the development of the Greater Bay Area.” (A9, Guangdong)

Although the construction of the GBA has the advantage of system superposition, it also needs to promote system innovation (Wang, 2019). In other words, it needs to make good use of the advantages of ‘one country’, do a good job in the connection of the ‘two systems’, integrate the resources of the ‘three regions’, and accelerate institutional innovation for the integrated development of HE (Xu and Lu, 2019). Moreover, the stakeholders—research labs, universities, foundations, and governments at different regional levels—need to take the opportunity to actively frame an effective HE system to establish the cluster resources.

Imbalanced profile in quality and quantity of HE provisions. The existing HE resources in the GBA are not balanced. For example, in terms of the number of students, HE in Guangdong has the most, Hong Kong is second, and Macau is third. In terms of educational reputation, Guangdong does have some established research universities, such as Sun Yat-sen University and the

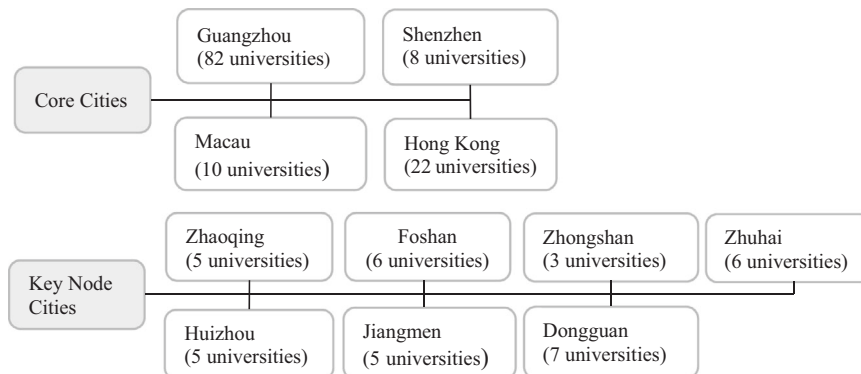


Fig. 4 Distribution of universities in the GBA. Source based on Ministry of Education (2021).

South China University of Technology. However, there is still a gap between Guangdong and the top universities in Hong Kong, while the overall strength of universities in Macau is weak in some dimensions, such as quantities, student source quality and international rankings. The university establishment in Macau does not show a long-standing history. Based on the list of national general HE institutions released by the Ministry of Education (2021), Guangdong Province has a total of 154 colleges and universities, 127 of which are located in just nine mainland GBA cities, Hong Kong has 22 and Macau 10 (Fig. 4).

In terms of the integration of industry and education, Guangdong has developed its manufacturing industry, which fosters universities’ integration with the development of the sector. This is Guangdong’s natural advantage compared to Hong Kong and Macau. However, in terms of faculty resources, the degree of internationalisation of universities in Guangdong needs to be further strengthened. In contrast, the degree of internationalisation of universities in Hong Kong and Macau is high. The key node cities in the GBA such as Zhaoqing, Jiangmen and Zhongshan less developed and invested in the HE sector than the core urban cities (Guangzhou, Shenzhen, Macau and Hong Kong).

“Although, at present, the cities in the GBA show different development potentials, if the GBA region develops into a world-class hub in the areas of higher education, culture, technology and innovation, each city in the GBA can benefit from attracting more international resources and talents.” (A10, Hong Kong)

Although there are five top-ranked universities in the GBA, they are all located in Hong Kong. None of the universities in Guangdong Province or Macau was ranked in the top 100 in the 2021 QS World University Rankings. With the three exceptions of Hong Kong, Guangzhou, and Shenzhen, cities in the Greater Bay Area have a shortage of research universities and scientific laboratories (Chen and Ma, 2019). When optimising the structure of HE in the GBA, how to take advantage of the resources and improve the quality of HE is a challenge that needs to be met (Li and Yuan, 2019).

The development of HE is closely related to the regional economy, policy, culture, industrial clusters, etc. From the end of 1960 to 1990, Hong Kong took advantage of the transfer of labour-intensive industries from developed to developing countries, adjusted its economic development strategy and rapidly developed into one of the ‘Four Asian Tigers’. With its strong economic foundation, Hong Kong became a leader in the development of HE in the region, far ahead of Guangdong and Macau, and laying the groundwork for the University of Hong Kong, Hong Kong University of Science and Technology, Chinese

University of Hong Kong, City University of Hong Kong, and Hong Kong Polytechnic University to become ranked among the world’s top 100 universities. It is hoped that Hong Kong’s lead in international HE, research quality and academic leadership will feed into the other cities. Two academics explained that:

“Besides optimising the structure of higher education in the GBA, how to innovate higher education governance mechanisms such as increasing universities’ autonomy in Guangdong and invigorating the resources of colleges and universities in the GBA region is a challenge for improving the quality of higher education.” (A4, Hong Kong; A11, Guangdong)

Progressing partnerships from co-operation to strategic co-ordination to resource sharing. HE clusters play an important function in the development of bay areas in collaborative regions. For instance, the New York Bay Area has a cluster of top-level universities, and the Tokyo Bay Area of Japan is home to the University of Tokyo and Tokyo Institute of Technology amongst others and is committed to improving HE in the area (Xu and Huang, 2019). The development of university clusters provides an advantageous foundation for exploring a new model of regional HE development.

“Looking at other bay areas’ experiences in the world, and based on the Chinese context, the construction of the GBA is a key opportunity to promote the development of university clusters in China.” (A1, Guangdong)

The Greater Bay Area is rich in types of HE that are highly complementary to each other. The universities in the GBA are characterised by diversity; they include not only research-oriented universities but also some which are technology-application-oriented (Lu and Zhuo, 2020). There are public, private, higher vocational, and cross-border universities. In terms of cultivating talent, they offer different training programmes for undergraduate and graduate students at various levels. Hong Kong has a number of research universities (e.g., the University of Hong Kong and the Chinese University of Hong Kong) and ample international HE resources. Macau also has considerable momentum in developing research-oriented universities. From a regional base, GBA conforms to the momentum of Chinese universities rising in the world rankings and seeks HE holistic development across the nation. The GBA aims to bring more universities and disciplines into the top ranks of the world by 2030 (Peters and Besley, 2019). The deepening of cooperation between the mainland, Hong Kong and Macau in HE can help to build the GBA into a leading global international education hub (Qi et al., 2020).

In recent years, Hong Kong HE institutions have set up cross-border institutions such as the Chinese University of Hong Kong, Shenzhen (CUHK-Shenzhen) on the Chinese mainland to provide more space for talent development and expand cooperation in education resources in the GBA (Cai and Geng, 2019). The planning and construction of other university branch campuses will play an important role in the collaborative innovation of regional HE (Ma et al., 2019). The establishment of new campuses by Hong Kong universities on the Chinese mainland can play a role in the Guangdong-Hong Kong-Macau region's university alliances and promote a win-win situation between Hong Kong and the mainland in terms of university governance, research and talent cultivation. In addition, Hong Kong universities have sent a large number of excellent graduates and research talent to the mainland (Cheng et al., 2016) while several mainland cities in the GBA have rapidly developed their manufacturing and information technology sectors, providing a relatively broad talent market that meets the job needs of graduates.

“It is important to build partnerships including government, universities, and industry, to create a world-class and high-level higher education cluster with Chinese characteristics and to innovate the model of higher education resource sharing so that the GBA can attract more elite talents.” (A14, Guangdong)

The multiple cores of the GBA coordinate with each other to develop HE and stimulate research and innovation in universities. The promotion of the development of regional HE is a gradual process, progressing from cooperation to co-ordination to harmonisation and, finally, to integration (Knight, 2012). The plan is that multiple stakeholders will establish a regional HE development mechanism, and the integration of industry and education in the GBA will be initially achieved by 2025. For example, improvement in and growth of collaboration and exchanges among the HE institutions in the GBA is encouraged (HK Government, 2021). Also, a further strengthening of scientific research cooperation between HE institutions in Hong Kong and those on the Chinese mainland is needed, which would bring new motivation for research development in HE (Cai and Geng, 2019).

Although there have been many instances of cooperation and exchanges in the HE fields in Guangdong, Hong Kong, and Macau in the past, this was mainly in the form of informal cooperation, spontaneously carried out by people responding to market demand or shared research interests; that is, it was a loose connection driven by the respective interests of the universities (Lu and Zhuo, 2020). This echoes the development model for cross-border co-operation from McNay's (1995) research in Europe. It means that some preceding forms of cooperation seemed to lack formal rules and formats within Guangdong, Hong Kong, and Macau. However, local and central governments have published some policies (e.g., State Council, 2019; Shenzhen Municipal People's Government, 2021) to facilitate official collaboration so that HE cooperation “has become more standardized” (A13, Macau).

At the end of 2016, the Guangdong-Hong Kong-Macau University Alliance was officially established, with Sun Yat-Sen University serving as the chair and the Chinese University of Hong Kong and the University of Macau as the vice-chairs. By 2021, a total of 40 universities in the GBA had joined the alliance, 24 in Guangdong, nine in Hong Kong and seven in Macau. The alliance aims to gather high-quality teaching and research resources from elite universities in the three locations, deepen educational exchanges and cooperation among universities, and jointly build a ‘one-hour’ (travel time) academic circle in

Guangdong, Hong Kong and Macau (People's Daily, 2016). In this way, it encourages universities to learn from within the Alliance (Li and Yuan, 2019). For example, by 2021 the University Alliance had established and developed 11 new professional associations so as to integrate the advantages of scientific research and local internationalisation to attract more talent (Xinhua Net, 2021). The depth, intensity, and breadth of cooperation in HE areas have gradually expanded, an important component of regional HE development.

“Before the establishment of the GBA, Hong Kong and Macau had some traditional and historical cooperative activities with Guangdong province. For example, some joint training doctoral programmes were simply based on the contracts between two cross-border universities such as the Southern University of Science and Technology (SUSTech)-Hong Kong University of Science and Technology and SUSTech-University of Macau joint PhD programmes, but they indeed connected the HE institutions, resources and students in Guangdong, Hong Kong, and Macau.” (A9, Guangdong)

“Chinese mainland universities can routinely recruit college students from Hong Kong and Macau, such as Jinan University in Guangdong province as always, which might, to some extent, boost university admission of students in Hong Kong.” (A4, Hong Kong)

Both the national and local governments have promulgated outlines, agreements, and systems to promote HE cooperation between Guangdong, Hong Kong, and Macau, making the cooperation between and exchanges of HE in the GBA more standardised and wider (Xu and Guo, 2019). In the context of the development of the GBA, regional cooperation regarding HE has gradually expanded from a few subjects to comprehensive cooperation (Li et al., 2020). For example, there was a variety and increase in the cross-border research collaboration between universities and regions in publishing co-authored articles, especially more between universities in Guangdong province and Hong Kong, such as Sun Yat-Sen University and The University of Hong Kong. The high-quality co-authored papers in the science research areas gradually meet the strategic needs of GBA's technological innovation and industrial layout (Ma et al., 2020). Under the national development strategy, the GBA HE institutions seem to have a good opportunity for internal and external cooperation (Zeng, 2019).

The GBA can also learn from the experience of the formation of Silicon Valley in the San Francisco Bay Area to fully mobilise and continuously stimulate the internal initiative and enthusiasm of universities and the technology industry (Chen and Chen, 2019). The GBA is home to a large number of mature high-tech enterprises. For example, the city of Shenzhen is an important centre of technological innovation: Huawei, ZTE, Tencent, DJI, BGI and other enterprises are leading the world in scientific research and development. There are a large number of outstanding scientists in the universities of Hong Kong, Macau and Guangdong who are capable of original innovation. By strengthening the relationship between universities in the GBA and scientific and technological innovation, and by integrating science and education, and industry and education, it is possible to promote the development of regional HE.

Discussion and conclusion

The paper discusses the development and characteristics of HE in the GBA. On the one hand, there is an extraordinary chance to improve the integration of and collaboration between HE

institutions and the regional coordinated development of the GBA. Also, building a cluster of world-class universities is important to enhance industry-university-research cooperation to meet the demands of economic and regional development. On the other hand, this development of HE has faced several, not trivial, difficulties. There is an imbalance in terms of HE resources and quality in each city. The ‘three currencies’, ‘three customs areas’, and ‘three legal systems’ of the GBA make it difficult to systematically design and establish cultural exchanges, frameworks, and agreements. The three systems mean the GBA is similar to the European Union format, working across different governance structures. The EU uses the carrot of research money to encourage alliances; for example, project teams bidding for grants in specific schemes have to have members from three or more EU countries. In addition, the EU Erasmus Programme supports students on joint courses and fosters student mobility across different areas. Although HE in the EU is government-sponsored rather than government-led as in the GBA, in both, governments provide strategic frameworks and resources. Therefore, the GBA can learn from EU experiences to improve the development of HE.

One of the important aims of the GBA is to help Guangdong, Hong Kong and Macau become international scientific and technological innovation centres by building an international education demonstration zone (Xu and Guo, 2019). That is to say, aiming to be at the forefront of global scientific, technological and industrial development, vigorously developing new technologies and industries, and accelerating the formation of an economic system with innovation as its main driving force and support (Ma et al., 2019). The formation and development of HE in the GBA, which is dominated by the government, needs to take into account factors such as management systems, cultural traditions, market environment and so on, and make timely dynamic adjustments to the relationship between government, market and university.

Obviously, the economy needs more graduates to expand at a high skill level, and innovation requires more high-quality research. Different universities are better equipped to support one or other routes, and both should be equally valued and equitably resourced. The GBA needs to explore an innovative HE model—such as the model of industry–university–research cooperation in the San Francisco Bay Area—to empower further scientific and technological innovation. A combination of the functional, organisational, and political approaches is needed to develop regional HE in the GBA as it has advantages in formulating and enlightening strategies. Therefore, in accordance with Knight’s framework (2012), it is suggested that these different approaches be combined when considering the opportunities and challenges involved in developing the HE sector of the GBA, and also to encourage innovation and emphasise policies to protect and attract talent and create an advanced research environment in HE institutions. Furthermore, the GBA is recommended to develop an international HE hub for integrated innovation to support multi-centre urban cluster development.

HE development has played a stimulating role in the advancement of science and technology, and training of talent, improving China’s soft power and providing strong vital support and motivation for social development. Developing HE in the GBA is important as it will play a role in stimulating the advancement of economic society (Xu and Lu, 2019). The development of HE in the GBA should be combined with the national ‘One Belt, One Road’ strategy to strengthen cooperation and exchanges on the international stage, seize essential opportunities to integrate the resources of the three regions of the Chinese mainland, Hong Kong and Macau, and further upgrade the quality of HE. HE should uphold the principle of regional sustainable development, implement the

‘one country, two systems’ policy, use the advantages of each city, and promote the coordinated and integrated development of universities (Xie et al., 2022).

Creating a world-class HE cluster and innovating the university cluster model is an urgent task for multiple sectors of society, including government, universities and industries (Li and Yuan, 2019). The GBA is a good environment to exploit to the fullest extent the role of high-level university clusters led by world-class universities (Zeng, 2019). The current trend in this coordinated development not only emphasises the driving role of the four core cities but also considers the perspectives of neighbouring cities in Guangdong in terms of HE regional cooperation and development (Lu and Zhuo, 2020).

Whether the GBA successfully becomes a technological innovation centre or builds a world-class urban cluster or not, it is worthy of further in-depth study and discussion by research scholars, policymakers, and governments. This study has explored the characteristics of regional HE in the GBA, which may help policymakers and universities formulate heuristic HE strategies to improve the quality of the HE system and regional integration. The intention of this research was to synthetically interpret the characteristics of HE within the GBA empirically by collecting useful data in response to the research questions. It aims to draw the attention of more scholars to keep a watchful eye on exploring the HE development in the GBA in both macro and micro aspects and employ insightful research to inspire national and international policymakers.

Data availability

Data used in this study are available from the corresponding author at reasonable request.

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Author contributions

We declare that each of us made a significant contribution to conducting this work. XJX drafted the design and work. XJX and XL revised the work. All authors were involved in analysing and interpreting the data for the paper. XL and IM reviewed and proofread the manuscript. All authors approved the final version.

Competing interests

The authors declare no competing interests.

Ethical approval

Ethical approval was obtained from the corresponding author's affiliated institution. It was confirmed that the research complied with ethical standards and was performed in accordance with relevant guidelines/regulations.

Informed consent

Informed consent was gained from all participants. The participants were all adults, and their participation is entirely voluntary. The personal data from all participants has been anonymised.

Additional information

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