

# A Study on the Collaborative Development Path of Technological and Financial Innovation in Guangdong-Hong Kong-Macao Greater Bay Area

Chengcheng Liu<sup>1,\*</sup>

<sup>1</sup>Faculty of Business and Management, Beijing Normal University-Hong Kong Baptist University United International College, Zhuhai, 519087, China

**Abstract.** Strengthening the synergistic development of science and technology finance in the Guangdong-Hong Kong-Macao Greater Bay Area (GBA) is of great significance in further promoting financial liberalization and innovation, and deepening the financial co-operation and development between the Mainland, Hong Kong and Macao. In view of the positioning and mission of the GBA, there are still a lot of areas that need to be strengthened in the synergistic development of science and technology finance among the three places. For example, there is no synergy in regional science and technology co-operation and innovation, such as differences in institutional systems, lack of science and technology and financial talents, lack of mechanisms for circulation and sharing of innovative resources, and uneven distribution of innovative advantages. Based on this, GBA needs to build a unified and efficient platform for collaborative innovation and vigorously promote the circulation of resources; strengthen innovation cooperation and cultivate a strategic engine to lead industrial development; and focus on industrial upgrading and promote institutional innovation to form a new pattern of science and technology financial cooperation.

## 1 Introduction

At present, China finds itself in a phase marked by swift adjustments in its economic structure, a shift in industries, and active strides in scientific and technological innovation. Within this context, it is imperative for the financial sector to assume a more significant role in propelling high-quality economic development [1]. The Greater Bay Area (GBA) Development Plan Outline underscores the importance of supporting Shenzhen in implementing pioneering initiatives in science and technology finance. It advocates for the robust growth of financial sectors with distinct characteristics within the GBA, the reinforcement of financial and technological frameworks, and the facilitation of collaborative advancements in science, technology, and financial innovation across Guangdong, Hong Kong, and Macao. The ultimate goal is to establish an international hub for science, technology, and innovation in the GBA [2].

Meeting the capital demands essential for scientific and technological innovation proves challenging for the innovation entity solely through internal capital accumulation. This underscores the need for establishing an efficient financial system dedicated to supporting such innovation. The strategic challenge then becomes how to guide the rational allocation of science and technology resources through financial development, enhance the regional innovation system, and boost the innovation capabilities of relevant entities within the

GBA construction efforts. Consequently, at this juncture, recognizing science and technology finance as a pivotal point becomes highly significant for Guangdong, Hong Kong, and Macao. It serves as a strategic breakthrough to open avenues for factor flow, optimize the distribution of resources like talent, technology, and capital, and maximize synergistic effects for achieving cohesive development in the construction of a world-class city cluster within the GBA. Building upon this premise, this paper examines the underpinnings of science and technology finance development in the GBA, scrutinizes existing issues and hindrances, and proposes conceptual frameworks and pathways for the integrated development of science and technology alongside financial innovation.

## 2 Basis for collaborative development of technology and finance in GBA

The GBA has a solid foundation in the financial industry and advantages in science and technology innovation. Financial co-operation among the three places has gradually deepened, with smooth channels for capital flow and technology docking, and a synergistic development of science, technology and finance has initially taken shape.

\* Corresponding author: [p930006116@alumni.uic.edu.cn](mailto:p930006116@alumni.uic.edu.cn)

## 2.1 Solid foundation for the development of the financial sector

The financial industry of the GBA has outstanding advantages and distinctive features, and the financial co-operation among Guangdong, Hong Kong and Macao has gradually deepened, and the development of the financial industry has a solid foundation. It is specifically manifested in the significant advantages of the financial industry in Hong Kong, Shenzhen and Guangzhou within the GBA have obvious advantages in the development of the financial industry, with two major stock exchanges, the Hong Kong Stock Exchange (HKSE) and the Shenzhen Stock Exchange (SZSE), and numerous banking, insurance, securities, and venture capital fund institutions clustered in the Bay Area. In 2022, the total economic output of the GBA will be more than 13 trillion RMB, with less than 1 per cent of the country's land area, 5 per cent of the country's total population, and Creating 11% of the country's total economic output, it is becoming an important powerhouse leading China's high-quality development. In 2021, the value added of the financial industry in the GBA will exceed RMB 1.5 trillion, an increase of nearly 35% from 2018, and accounting for over 10% of GDP. According to the 34th Global Financial Centres Index (GFCI) ranking published by GFCI in September 2023, a total of three cities in the GBA are among the top 30 global financial centres, with Hong Kong ranked No. 4, Shenzhen ranked No. 12, and Guangzhou ranked No. 29, demonstrating the strong financial strength of the GBA.

In addition, from a regional perspective, the 11 cities in the GBA are distributed in four echelons: Hong Kong, Shenzhen and Guangzhou are in the first echelon, with a total GDP of more than RMB 2 trillion and an added value of the financial industry of more than RMB 200 billion, with the added value of the financial industry in the three cities accounting for more than 80 per cent of the total added value of the financial industry in the GBA; Foshan and Dongguan are in the second echelon, with the value added of the financial sector in the range of RMB 50 billion to RMB 60 billion; Huizhou, Zhuhai, Macao and Zhongshan belong to the third echelon, with the value added of the financial sector ranging from RMB 30 billion to RMB 50 billion; and the fourth echelon consists of Jiangmen and Zhaoqing, with the value added of the financial sector below RMB 25 billion.

On top of that, the financial markets in the GBA have vibrant capital flows. By 2022, Hong Kong's assets under management will be as high as HK\$30.5 trillion. As at the end of June 2023, the consolidated total capital adequacy ratio of Hong Kong's local banks was 21%, which was much higher than the international minimum requirement of 8%. As the world's largest offshore Renminbi market, Hong Kong's Renminbi capital pool is close to RMB 900 billion yuan, and more than 70% of offshore Renminbi transactions are completed in Hong Kong. As for the securities industry, Hong Kong has ranked first in the world for the second consecutive year in terms of the total amount of funds raised through

initial public offerings, further consolidating the HKSE's leading position in the global IPO market.

In addition to this, the development cities in the GBA have unique location advantages. The developed level of economic development and strong level of technological development of the Bay Area provides a good foundation for the development of fintech in GBA, and the inclusion of Hong Kong and Macao such as the window of the intersection of China and the West, with the convenience of international and domestic exchanges, provides a good condition of location advantage for the development of financial innovation, especially the development of fintech.

This unique advantage provides fertile ground for the development of financial innovation such as fintech and digital finance in the Bay Area. The four echelons of the GBA also create favourable conditions for regional fintech to promote technological innovation, as well as joint regional development [3].

Additionally, financial co-operation in the GBA has gradually deepened. In terms of direct investment, direct investment from Hong Kong and Macao accounts for about 90% of the investment capital flowing into the nine PRD cities. In terms of co-operation in mutual establishment of financial institutions, more than 10 Shenzhen securities, funds and futures companies have set up subsidiaries in Hong Kong; nine Hong Kong securities and futures operators have set up representative offices in Shenzhen, and a number of innovative institutions such as HSBC Qianhai Securities and East Asia Qianhai Securities have set up their offices one after another [4]. In terms of cross-border financial business, the Mainland and Qualified Foreign Institutional Investors (QFII), Qualified Foreign Limited Partner (QFLP), Qualified Domestic Institutional Investor (QDII), Qualified Domestic Limited Partner (QDLP) have been piloted or launched, enriching the categories of investment products and investment channels for domestic and foreign investors.

## 2.2 The advantages of science, technology and innovation

There is a continuous emergence of financial and technological enterprises, showcasing a robust allure for innovation factors. The GBA stands out with formidable innovation capabilities, a well-rounded innovation system, and abundant innovation vitality. Notably, Guangzhou and Shenzhen take the lead in driving Guangdong's innovation-oriented development, fostering numerous national high-tech enterprises and "unicorn" companies, alongside a plethora of small and medium-sized high-tech firms. In 2022, CB Insights, a US-based venture capital research organization, unveiled the Global FinTech 250, where fintech enterprises in the GBA demonstrated noteworthy performance. According to the Hong Kong Monetary Authority, the swift expansion of fintech companies in Hong Kong, coupled with the issuance of relevant licenses, surged, exceeding 600 in 2021, with over 30 enterprises originating from the Mainland [5].

Furthermore, Guangdong, Hong Kong, and Macao house a multitude of universities, research institutes, high-tech enterprises, and nationally significant scientific projects, wielding substantial influence nationally and globally. This robust presence of innovation factors lays

a solid foundation for establishing an international science, technology, and innovation hub, as detailed in Table 1.

**Table 1.** Comparison of data on innovation entities and innovation outcomes in the four major bay areas.

Indicator name	unit (of measure)	GBA	Bay Area, New York	Tokyo Bay Area	San Francisco Bay Area
Fortune Releases Fortune 500 Companies	classifier for families or businesses e.g. shops, companies	25	24	40	10
universities and colleges	classifier for houses, small buildings, hospitals and institutions	180	227	120	73
Top 100 Universities in the World	classifier for houses, small buildings, hospitals and institutions	5	2	2	3
Patent disclosure of inventions	ten thousand pieces	176.9045	21.9394	72.616	29.9919

Secondly, the innovation system is well developed and has strong complementarity. The GBA has developed a complete science and technology innovation system with the help of a good innovation foundation and huge innovation investment in the GBA. There are a large number of scientific research structures and innovation platforms in the GBA. Including 39 universities in Hong Kong and 12 in Macao, the GBA has as many as 172 institutions of higher education of various types, among which five universities, are ranked among the top 100 universities in the world. South China University of Technology (SCUT) and Beijing Normal University - Hong Kong Baptist University United International College (UIC) are all well-known universities in China. SCUT has a strong engineering focus and has nurtured a large number of innovative talents. As early as in the 1980s, it produced the three giants of China's television industry, which was a high-tech industry at that time. Nowadays, SCUT has nurtured the founder of Xiaopeng Automobile, leading the development of new energy vehicles in China. UIC, as a cooperative university between Mainland China, Hong Kong, Macao and Taiwan within the city of Zhuhai, Guangdong Province, China, is in line with the international standards and provides students with high-quality academic resources and advanced teaching methods.

There are also a large number of autonomous innovative enterprises in the GBA. Huawei in Shenzhen, Tencent and BYD are leaders in independent innovation across the country and the world, and have achieved fruitful results. In addition, the GBA has a large number of co-operative innovation platforms, making the innovation system more complete. Four national key laboratories, including the University of Macau, have set up branches in the special area of Hengqin. 2022-2023 will see more than 20 joint Guangdong-Hong Kong science, technology and innovation funding programmes, with substantial financial support from Guangdong's provincial coffers.

In addition, there exists a strong mutual complementarity in the innovation systems. Hong Kong plays a pivotal role as an "international bridge" in constructing technology and financial ecosystems within the GBA. On the western coast of the PRD, encompassing cities like Guangzhou, Foshan, Zhuhai, and Zhongshan, there is a robust foundation in household electrical appliances, equipment manufacturing, and scientific research support. Meanwhile, the east coast cities, primarily Shenzhen and Dongguan, excel in strategic emerging industries such as communications, internet, and electronic equipment manufacturing. Particularly in Shenzhen, the added value of advanced manufacturing industries contributes to over 70% of the added value of industries above designated size. In Guangzhou, the advanced manufacturing sector represents 58.4% of the total industrial output value, with the number of national high-tech enterprises experiencing rapid growth at an average annual rate of around 89% for three consecutive years.

Thirdly, the GBA has invested heavily in R&D. The GBA has invested heavily in research and development (R&D). According to the Statistical Yearbook of Guangdong Province and the statistical yearbooks of Hong Kong and Macao, in the past two years, R&D investment in the GBA accounted for about 3.72% of the GDP, and the R&D expenditure exceeded RMB 360 billion yuan, which is far more than the national R&D expenditure as a percentage of the GDP of 2.4%, and far more than the average level of the United States of America of 2.8%. This achievement is itself achieved with a relatively large share of GDP. The proportion of R&D investment in GDP is an important indicator of the region's commitment to science and technology innovation, and shows a strong correlation between real money and investment and again, not only does it perform better domestically, but internationally, it is also stronger when compared to developed countries such as the United States.

The GBA also performs well in terms of the growth rate of R&D personnel and R&D investment, with the GBA experiencing a good growth rate in both R&D

activity personnel (persons) and internal expenditure on R&D funding (billion) in 2019-2020, as Table 2 shown.

**Table 2.** R&D activities and expenditures of industrial enterprises above designated size by sub-city.

		Number of R&D Personnel(Person)		Internal Expenditure on R&D (100 Per Cent; Million Yuan)	
		2019	2020	2019	2020
	Guangzhou	99979	105364	286.24	315.11
	Shenzhen	302042	345344	1049.92	1157.31
Guangdong	Zhuhai	34234	34522	93.33	93.94
	Foshan	92022	98761	259.71	238.86
	Huizhou	56291	57344	99.78	115.26
	Dongguan	124459	135841	260.57	308.42
	Zhongshan	31176	32129	59.66	68.03
	Jiangmen	33170	37269	65.07	70.13
	Zhaoqing	10640	10340	23.35	21.19
Hongkong		35416	36106	263.32	265.53
Macao		1720	1735	30.35	30.33
GBA		784013	856914	2197.63	2388.24

Furthermore, GBA is rich in innovation policies and strong in innovation service support. And the types and perspectives of Science and Technology Innovation (STI) policy support are also diverse, basically covering the policy support needed for STI development. The policies and measures provide a solid foundation for the development of science and technology innovation in the GBA. In addition, the GBA has a strong support capacity for innovation services. Efforts have been made to give full play to the role of policy funds in demonstrating guidance and capital amplification, and to address issues such as fund positioning, operation modes and incentive mechanisms. The government participates in VC, science and technology innovation through various modes such as direct investment, equity participation in the establishment of new funds for investment, and follow-up investment.

Since 2022, Guangdong Province has set up 13 cities in Guangzhou, Shenzhen, Zhuhai, Shantou and other cities to establish Guangdong Free Trade Zone (FTZ) linked development zones, and the FTZ linkage test, synergistic innovation, resource sharing [6]. At the same time, Zhuhai actively linked with Macao, Hengqin to build the "Cross Gate Financial Zone" [6]. At the same

time, Zhuhai actively linked to Macao, Hengqin construction of the "Cross Gate Financial District", planning to use 5-10 years to create Guangdong's financial development "third pole". On this basis, the future can further promote the Guangdong Pilot Free Trade Zone Guangzhou Nansha, Shenzhen Qianhai, Zhuhai Hengqin three large areas of complementary advantages and linkage development, promote the construction and sharing of resources, and enhance the overall competitiveness; to strengthen the Pearl River Delta and Hong Kong's financial industry division of labour and the pattern of collaboration, in the international financial hub in the construction of the consolidation and enhancement of Hong Kong's position as an international financial centre [7].

### 2.3 Initial formation of synergistic dynamics in science, technology and finance

In recent years, Guangdong Province has placed significant emphasis on the convergence of science and technology with finance. In 2023, a substantial investment of 0.93 billion yuan was allocated to the



realm of science and technology finance. This investment facilitated 427 instances of venture capital injections and 169 cases of intellectual property pledge financing. The integrated network of science and technology finance, established and solidified during this period, essentially blankets the entirety of Guangdong Province. Additionally, within the GBA, Hong Kong has already secured its position as one of the world's top three financial centers. Simultaneously, Shenzhen has established a comprehensive market structure, encompassing the main board, small and medium-sized board, and venture board markets, leveraging the Shenzhen Stock Exchange. Furthermore, the region boasts Guangdong's three major regional equity trading markets, collectively providing a diverse array of financial resources and multi-tiered channels for capital inflow and exit strategies, thus fortifying support for the development of science and technology innovative enterprises in the GBA [8].

The specific performance is as follows: the cooperative service system has basically been completed and The double-wheel drive of science and technology + finance is in a good situation. In the area of financial technology, Shenzhen and Hong Kong have signed a Memorandum of Understanding (MOU) to jointly launch the Financial Innovation Award and the Special Award for Financial Technology, jointly organise a series of activities such as the "China-Shenzhen FinTech Global Summit", and take the lead in launching the "Shenzhen-Hong Kong-Macao Financial Technologist Talent Scheme" to lay a solid foundation for the innovative development of financial technology in the GBA. At the same time, it also took the lead in launching the "Shenzhen-Hong Kong-Macao Financial Technologist Programme", laying a solid foundation for the innovative development of financial technology in the GBA.

The GBA endeavours to promote the clustering of innovation resources and create an innovation capital system based on the Bay Area and radiating to Southeast Asia and South Asia. The number and scale of VC/PE in Guangdong is expanding rapidly. As at the end of August 2023, the number of private equity fund managers in Guangdong Province (excluding Shenzhen) was 1,704 private equity fund managers in Guangdong Province (excluding Shenzhen), with a fund size of 1,300.430 billion yuan under management, while the number and size of private equity fund managers in Shenzhen reached 3,472 and 2,199.666 billion yuan respectively, which is at the forefront of the country. Hong Kong is the second largest private equity fund investment centre in Asia, with its funds accounting for about 15% of Asian private equity fund investment, and it has obvious advantages in the field of international VC/PE funding. Macao and Zhuhai have more obvious characteristics in the bond market, financial leasing, wealth management and other business areas. Zhuhai has accelerated the development of equity and venture capital industry in recent years, and has become one of the three major private equity fund clusters in the province.

### 3 Constraints affecting the integration of technology and finance in the GBA

Confronted with the challenge of coordinating the nine prefecture-level cities in the GBA along with the two Special Administrative Regions of Hong Kong and Macao, the primary objective is to enhance the integration and development of city clusters in the GBA, particularly in the realms of science, technology, and finance. This constitutes the foremost task in propelling the synergistic development of innovation across science, technology, and finance. Several constraints hinder the integrated development of science, technology, and finance in the GBA:

Firstly, obstacles arise from institutional system differentiation. Guangdong, Hong Kong, and Macao grapple with the complex "one country, two systems, and three sets of legal systems" framework. Notably, substantial variations exist in institutional policies pertaining to science and technology, finance, economy, and international exchange and cooperation. Additionally, specific cooperative policies necessitate approval from relevant state departments, amplifying the cost of communication and negotiation among the three regions. These factors stand as foundational constraints impacting the harmonized development of science, technology, and financial innovation in the GBA.

Secondly, discernible differences persist in the level of science and technology finance across the GBA. Despite being in close proximity, Guangdong, Hong Kong, and Macao have yet to achieve differentiated and complementary development. Notably, there is a considerable internal development gap, with non-core cities engaging in homogeneous competition for financial resources. This results in suboptimal efficiency of financial cooperation, lacking the desired synergy and inclusiveness.

Thirdly, challenges emerge from the uneven distribution of innovation resources and the absence of a resource circulation and sharing mechanism. Hong Kong, Macao, and the nine cities in the Pearl River Delta possess distinct innovation advantages. The specific challenge lies in realizing interoperability and complementarity concerning policy planning, the flow of innovation resources, and industrial undertakings. Addressing this challenge is crucial for achieving the desired synergy in science, technology, and financial innovation in the GBA.

To achieve interoperability and complementarity within the GBA, it is crucial to establish a long-term mechanism for the circulation and sharing of innovation resources. In addition, there is administrative fragmentation and exclusivity in the sharing of science and technology innovation factors among the nine cities in Guangdong. How to establish and improve the relevant systems and incentives regarding the circulation of innovation resources among cities in different institutional contexts is the key to promoting the synergistic development of science and technology and financial innovation in the GBA.

## **4 Development path of technology and financial innovation co-innovation in GBA**

GBA needs to continuously improve and perfect the system of scientific and technological innovation, and form a market-oriented and enterprise-oriented scientific and technological innovation system. In the process of constructing a collaborative innovation platform, the participation of relevant departments as well as colleges and universities should be encouraged more, and their active role should be given full play to, so that better scientific and technological achievements can be achieved [9]. For example, the Pearl River Delta should learn from the advanced institutional mechanisms of Hong Kong and Macao's free ports, and explore more flexible policy systems, regulatory models, and management systems in the areas of trade, investment and financing, fiscal and financial services, and customs clearance and facilitation, so as to build a pioneer zone for a new open economy system and further enhance the internationalization of the business environment in the Bay Area. Hong Kong, Guangzhou, Shenzhen and Zhuhai will be regarded as the core area for the concentration of scientific and technological financial resources and an important platform for financial innovation and development in the Bay Area, so as to build a demonstration zone for the innovation of the institutional mechanism for in-depth regional cooperation among Guangdong, Hong Kong and Macao, and thus trigger the "chemical reaction" of the complementarity of the two systems. In addition, the GBA should accelerate the interconnection of financial factors and establish collaborative innovation bases and alliances, etc. In particular, the establishment of the "Bay Area Science and Technology Finance Co-ordination and Innovation Alliance" will play a pivotal role in instituting a systematic coordination mechanism for the financial industry within the GBA. This initiative aims to deepen collaboration across various dimensions, including the financial market, institutions, talent pool, legal frameworks, and other critical areas. It also seeks to advance the development of science and technology financial operational rules and systems characterized by both Chinese uniqueness and alignment with international practices [10]. Proactively advocating for the relaxation or elimination of restrictions on the foreign shareholding ratio in securities and financial asset management companies, the initiative aims to reduce the barriers for entry for financial institutions from Hong Kong and Macao. Furthermore, concerted efforts will be made to establish channels for mutual establishment with financial enterprises in Hong Kong and Macao. Another strategic move involves intensifying efforts to expand cross-border RMB businesses, such as two-way financing and capital pooling, along with the issuance of RMB bonds in Hong Kong. Simultaneously, there will be a deliberate exploration of initiatives to enhance account innovation and facilitate cross-border trading of financial assets within the FTZ.

According to the differences in the level of economic development of various places, the GBA should optimise the layout of finance, industry, science and technology research and development, so as to achieve positive interaction and coordinated development of modern finance in the Bay Area. Vigorous efforts should be made to develop innovative finance, including venture capital, risk investment, and the SME and GEM boards. The region should focus on optimising the pattern of synergistic development; and accelerate the promotion of the flow of scientific and technological talents in cross-border cooperation. For the GBA, the "Talent Green Card" system can be constructed to continuously improve and perfect the mechanism for introducing scientific talents, so as to make it more attractive to professional talents. In addition, universities can be promoted in the GBA to carry out multi-level and multi-disciplinary exchanges, and actively explore the mechanism of joint cultivation of talents and mutual recognition of credits; introduce foreign high-quality educational resources, build a cross-regional platform for the exchange of talents, and cultivate composite international scientific and technological innovation talents. In addition, it should build a cooperation carrier for science and technology finance, and promote the construction of national independent innovation demonstration zones and national dual-innovation demonstration bases and crowds creation spaces. Based on the relevant financial reform and innovation experimental work, such as the Pearl River Delta Financial Reform and Innovation Comprehensive Experimental Zone and the "Internet Plus" Crowd Creative Financial Demonstration Zone. The Hong Kong Government has invested more than HK\$18 billion, mainly for cooperation with Mainland institutions, to support more Hong Kong universities to build their branch campuses, industrialization bases and research centres in the GBA. In addition, it will build financial industrial parks with special characteristics in Hong Kong and Macao, and actively explore new modes of cooperation in the operation of enclave cities, so as to provide high-quality office environments and ancillary facilities for financial institutions with special characteristics, such as financial leasing, wealth management, and so on.

To facilitate industrial transformation and upgrading, elevate the regional level of scientific and technological innovation, and enhance the core competitiveness of industrial development, a synergistic model for integrating science, technology, finance, and industry is envisioned. Firstly, the emphasis lies in establishing a financial chain closely aligned with the industrial chain. This involves encouraging insurance companies to fortify specialized branches dedicated to science and technology insurance. Simultaneously, support is extended to banks and insurance institutions to craft financial products tailored to the characteristics of technology trade. The initiative includes establishing investment and financing docking platforms to provide financial services for both the industrial and innovation chains. In key areas such as Zhuhai, Foshan, Jiangmen, and Zhaoqing, there is a strategic focus on constructing

and shaping the advanced equipment manufacturing industry belt on the west bank of the Pearl River Estuary. The objective is to facilitate the integration of industrial and financial capital by actively developing new business forms, including financial leasing.

Secondly, the central focus of the integrated development of science and technology and finance in the GBA aims to serve the transformation and upgrading of the industrial structure across the three regions, augmenting the core competitiveness of regional industries. Future collaboration among Guangdong, Hong Kong, and Macao should be geared towards joint advancements in science, technology, industry, and finance, fostering the creation of additional key industrial zones. Accelerating the development of industries such as information consumption and high-tech services is a specific goal. Moreover, in the GBA's industrial integration and development process, careful attention must be given to optimizing industrial spatial distribution. This involves expediting the outward relocation of traditional manufacturing while actively promoting the concentration of advanced manufacturing and modern service industries in the central city. The ultimate aim is to gradually shape a world-class science and technology innovation corridor, with Hong Kong, Shenzhen, and Guangzhou serving as the primary axis of development.

## 5 Conclusion

In the current phase of development, the GBA has strategically positioned itself to leverage technology and finance as key drivers for breakthroughs. Recognizing the imperative to establish seamless channels for the flow of essential elements, the region aims to optimize the allocation of resources such as talent, technology, and capital. This optimization is envisioned to enhance synergies, fostering collaborative effects for the realization of integrated development. The implications of such collaborative efforts extend to the construction of a world-class city cluster within the GBA, thereby underlining the pivotal significance of this approach.

This article systematically reviews the foundational elements of the development of science and technology in the financial sector within the GBA. It delves into an insightful analysis, identifying prevailing challenges and obstacles that impede the seamless integration of technology and finance. In response to these challenges, the paper proposes a comprehensive strategy aimed at fostering synergies between technological and financial innovation. The outlined approach seeks to address the identified issues and unlock the full potential of collaborative development.

Central to the proposed strategy is the optimization of the interconnectivity between the technological and financial sectors, with an emphasis on streamlining the flow of resources. The article underscores the need for strategic interventions to overcome existing barriers, paving the way for a harmonious and mutually reinforcing relationship between science, technology, and finance. By charting a course for collaborative

development, the paper contributes to the ongoing discourse on positioning the GBA as a global exemplar of integrated urban development.

## References

1. T. Zhou, SF (05), (2020).
2. People's Daily, Outline of the development plan for the Guangdong-Hong Kong-Macao Greater Bay Area. <http://politics.people.com.cn/n1/2019/0219/c1001-30803984.html>.
3. Guangdong South China Science and Technology Capital Research Institute. 2017 Research Report on Science and Technology Financial Development in Guangdong Province (2017).
4. L. Peng, N. Meng, L. Ma, Y. Ma. SF (1), (2019).
5. J. Xie, J. Xu. WF- (8), (2013).
6. Guangzhou Daily Data and Digitalisation Institute. Guangdong, Hong Kong and Macao Greater Bay Area Collaborative Innovation Development Report. <http://gd.people.com.cn/GB/n2/2018/0921/c123932-32085048.html>
7. F. Li, Innovation of Guangdong-Hong Kong-Macao Greater Bay Area Co-operation Mechanism to Build a World-Class City Cluster in Proceedings of China Think Tank Economic Watch Conference (CTTEWC) (2018).
8. W. Xu, Z. Fu. JSCUT (4), (2019).
9. J. Long. GE (2), 62-65 (2018).
10. Y. Zhong, X. Hu, Econ. (12), 27-35 (2017).