ANALYSIS OF THE CURRENT SITUATION OF UNIVERSITY-CITY INTEGRATION DEVELOPMENT BASED ON DATA MINING TECHNOLOGY AND EXPLORATION OF THE OPTIMIZATION PATH

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Reception: 16/03/2023 **Acceptance**: 22/05/2023 **Publication**: 08/06/2023

Suggested citation:

Ma, X. and Eng Lin, S. (2023). **Analysis of the current situation of university-city integration development based on data mining technology and exploration of the optimization path**. *3C Tecnología. Glosas de innovación aplicada a la pyme, 12(2)*, 163-182.

https://doi.org/10.17993/3ctecno.2023.v12n2e44.163-182

ABSTRACT

University is an inevitable product of a city's development to a specific stage. In different social environments and historical stages, universities always develop symbiotically with cities, and the integration of the higher education system and emerging technologies can accelerate the regional economic development of universities and cities. Based on data mining technology, this study uses a neural network algorithm to establish an algorithmic model and sigmoid function as the incentive function to analyze the integration development of emerging technology industry and universities in Dongguan city and provide an optimization path for the integration development of city and universities. The research results show that in the field of scientific and technological research results, the universities in Dongguan City applied for 49,726 patents in 2021 and authorized 25,523, with an efficiency rate of 51.33%. In the area of urban economic development, Dongguan's GDP in 2021 showed strong momentum, achieving a regional GDP of 108.554 billion yuan, an increase of 8.2% over the previous year.

KEYWORDS

Higher education; regional economy; data mining; integration development; optimization path

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https://doi.org/10.17993/3ctecno.2023.v12n2e44.163-182

1. INTRODUCTION

The 21st century is an era dominated by the knowledge economy, and knowledge innovation and technological innovation are the main features of the era. It is the basic requirement of the era to lead industrial transformation and upgrading through scientific and technological innovation, and to drive the integration and development of cities [1]. Facing the call of the new era and the profound transformation of social life, universities have started to re-examine their functions and status, and cities are also facing new choices in their development, and the integration of universities and cities is the trend [2]. The research on university-led urban economic and social development is of great theoretical value in reconceptualizing the relationship between universities and society, especially the relationship between universities and local communities [3]. In the knowledge economy society, universities are axial institutions with extensive ties to society, which helps to deepen the understanding of basic issues such as the relationship between epistemology and political theory philosophy of higher education, the functions of universities, and universities and society, etc. In the era when the knowledge economy is prevalent, strengthening the ties between universities and enterprises and enhancing the interaction between university science and technology innovation and the development of new industries in cities is the reform and development of universities, innovation of enterprises, and leading The inevitable requirement of society is the way to enhance the core competitiveness of cities, and it is also an effective way to build a national innovation system [4]. Studying the issues related to the interaction mode between university science and technology innovation development and urban emerging industry development is not only an important issue in the field of higher education but also a cross-cutting issue in the fields of sociology, urban economics, and urban political science [5].

Data mining technology is the process of analyzing the correlation between data or studying its data patterns to obtain information of application value from a large amount of data that contains useless information [6]. Unlike traditional data analysis, the process of data mining has no clear assumptions, and the knowledge obtained from data analysis and mining needs to be valid and practical [7]. Among other things, knowledge here refers not to truths, scientific theorems, or pure mathematical formulas in the traditional sense, but rather to relative, new relationships, patterns, and trends that hold under specific conditions and in a specific domain [8]. Data mining technology emerged in the 1980s when its application was mainly oriented to the problems encountered in traditional data processing applications. With the advent of the big data era, more and more open source data have become easily accessible, and these complex and massive data are rich in value, but the huge amount of useful information is often mixed with useless data, which is difficult to identify, resulting in the phenomenon of "data explosion and knowledge paucity" [9]. This requires a more efficient way to find and explore the value in the huge amount of data, and data mining is one of the key technologies. Data mining technology has been widely used in the fields of urban air environment monitoring, urban traffic management, and urban

https://doi.org/10.17993/3ctecno.2023.v12n2e44.163-182

emerging technology industry combination, among which Zhang L et al [10] selected the weather monitoring data of a city and analyzed the haze weather using a general joint matrix decomposition framework for data integration and its systematic algorithm, and gave a case proof of the proposed data mining algorithm, and the results showed that the algorithm was high accuracy. Mcevoy D et al [11] proposed a data mining algorithm to support climate-adaptive urban development and empirically analyzed the impact of meteorological elements on urban haze. Masey et al [12] used data mining techniques based on bilinear transformation and ICEEMDAN framework to analyze the main reasons for the degradation of urban air quality from an economic point of view, which are the rapid development of urban economy, high-emission industrial and energy structure, and backward environmental protection technology, Korres M P et al [13] used the clustering algorithm in data mining technology to drill down and analyze the causes of haze formation and its impact on all sectors, and indirectly and directly give adjustment suggestions and optimization paths to achieve urban haze management at the source. In urban traffic management, Zhang Q [14] and Cali S [15] et al. mined big data through the integration of intuitionistic fuzzy multi-criteria evaluation for marketing, supply, and purchasing decisions. B Z Z [16], Simovici D [17] et al. provided an idea to discriminate traffic status based on data mining techniques and validated the idea by observing the traffic flow information that The features such as average occupancy, green light phase saturation, and traffic flow were selected for traffic state discrimination, and how to build a traffic state data mining clustering matrix was discussed. Using data preparation techniques, traffic engineering techniques collect traffic data through the loop coil detector of the road, through which four clustering matrices of smooth flow, stable flow, congested flow, and blocked flow can be calculated. Broto [18] based on data mining techniques through spatiotemporal analysis and deep residual networks to analyze the problems in urban governance and construction, and can to some extent realistically reflect the bottlenecks of development and provide a reference for the steady development of cities, Zhang Y [19] based on data mining using big data and knowledge mining methods oriented to intelligent production found that emerging technology industries are most closely related to economic growth, and considered that vigorous development of high-tech industries is a key strategy for stable economic growth, Yan Q [20] used the clustering algorithm in data mining for the integration, data mining, and decision support in informatics of integration, data mining, and decision support, and found that high-tech industries have obvious development advantages and prospects. The continuous development and progress of cities, it is bound to affect the construction process of universities. Kim D Y [21], by establishing an analytical model of simplification and integration methods of data between strategic urban industries and university talent training, concluded that universities should accelerate the cultivation of science and technology innovation talents that adapt to the development of emerging industries in cities and accelerate the pace of university-enterprise interaction, besides, there are scholars who, from the perspective of professional construction, give In addition, some scholars give suggestions on the cultivation of talents from the perspective of professional construction. There are three main characteristics of universities supporting urban development: first, highlighting technical disciplines to support

https://doi.org/10.17993/3ctecno.2023.v12n2e44.163-182

technological innovation, second, deep cross-fertilization of disciplines to contribute to breakthroughs in urban industrial groups, and third, the combination of disciplinary layout points to synergize urban industrial development [22]. To achieve the integrated sustainable development of strategic cities, universities should promote the research and development of urban technology in professional construction on the one hand, and provide a continuous supply of scientific and technological innovation talents on the other hand [23].Tang M et al [24] based on the application of multi-attribute large-scale group decision-making in circular economy development by data mining and group leadership, which is considered to be inextricably linked to the development of urban emerging industries Therefore, it is necessary to optimize the professional structure setting of universities to better connect with the upgrading of urban emerging industrial structure and market demand. From the perspective of science and technology innovation results, the effective docking mechanism between university science and technology innovation results and urban industrial demand development is discussed in depth, and local universities should strive to enhance the ability of science and technology innovation results transformation to provide scientific and technological support for urban industrial development [25-27]. Regarding the research on the integration mode of university science and technology innovation and urban emerging industry development, Sain K et al [28] found that after exploring the academic behaviors of university researchers by developing an integrated early warning system based on artificial intelligence, the interaction modes between universities and urban industries mainly include four categories of joint participation, mutual influence, joint action, and close relationship, due to the different starting points and interest-driven degrees of research behaviors Ali M [29] and Mariani D [30] suggested that through the integration of demand analysis and local cultural wisdom, it is possible to scientifically differentiate talent teams, establish a differentiated talent evaluation system, innovate a "comprehensive + dynamic" training model for scientific and innovative talents, and establish a talent pool for urban development. Zabit M N [31] took the development and validation of the integrated learning method of problem learning as an example of the science and technology evaluation system of "basic research for the world and applied research for the market", revised the relevant policies and texts, innovated the interaction mode with evaluation as the main body, and promoted universities to actively adapt to the development of urban emerging industries. Son K S et al [32] proposed a triple interaction model of "R&D platform-research team-technology innovation" based on the integration of university and city, taking into account the development characteristics of urban emerging industries and the impact of common cause failure and periodic testing.

In summary, at this stage, researchers have conducted a lot of research on data mining technology and analyzed it's supervising and promoting effects on urban development, but often ignore the correlation between cities and universities, and use data mining technology in the research of integration development of cities and universities is almost not involved. In this paper, we use data mining technology to systematically study the interaction mode between university science and technology innovation and urban emerging industry development, and propose specific innovation

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paths, and the study amends and supplements the existing theories in light of China's reality and the special characteristics of higher education development, which is important for enriching and developing theories of higher education, education economics, and urban sociology in China. According to the current situation of regional development, the optimal path for the integration and development of cities and universities is explored.

2. CITY AND UNIVERSITY INTEGRATION DEVELOPMENT

Urban culture provides rich nourishment for the formation of local university culture. The role of city culture in local university culture is mainly expressed in rich soil, sufficient nutrients, and innovative sources. What kind of characteristic city culture there is, there will be what kind of characteristic local university culture. The city culture puts a distinctive regional imprint on the local university culture, and the two forms a unique cultural form through extensive interaction, communication, and penetration. In the process of building the university culture, the university will continuously draw on the cultural nutrients of the city, such as the city's history and humanities, excellent traditional culture, red culture, etc., and then become a participant and creator of the city culture, further revealing the connotation and essence of the city culture. As an important part of the city culture, the local university culture is inevitably influenced by the subtle influence of the city culture, and the city culture supports the construction and development of the local university culture.

2.1. CHARACTERISTICS OF INTEGRATION DEVELOPMENT

University is the product of the development of urban civilization to a specific stage, and likewise, the city is the fertile ground for the emergence and development of the university. From the perspective of human civilization, a history of higher education development is also a history of interactive development between universities and cities and continuous integration with society, which runs through all stages of higher education from elitism to popularization and has profound inner inevitability. The relationship between universities and cities can be traced back to medieval Europe. The majority of medieval universities, formed by the market or founded by the church, emerged in the central cities of Europe. In the United States, for example, universities were generally established in the economically prosperous "cities" of the future. The American Civil War accelerated the process of urbanization, and by the end of the 19th century, a network of American cities had taken shape nationwide. The gradual urbanization of universities had a great impact on higher education in terms of enrollment scale, types of institutions, sources of students, etc. In the 1960s, universities, and cities not only strengthened their spatial ties with cities, but also developed comprehensive interactions in the fields of economy, science and technology, and culture. After the 1990s, as the U.S. entered the metropolitan era, universities and cities became more and more interdependent in various fields,

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forming a symbiotic relationship of "you in me, I in you", showing an obvious endogenous demand. In the process of constant balancing and coordination, universities and cities find common needs and balance points for their development and increasingly become a community of relationships, interests, and destiny.

2.2. INTEGRATION DEVELOPMENT ADVANTAGES

In the large system of social development, universities, and cities are two interdependent, mutually cooperative, and mutually promoting subsystems. The university subsystem provides talent training, science and technology innovation, and other services for the strategic layout of the city development through the interaction and opening with the city and other external environment, while the city subsystem provides various kinds of rich resources for the survival and development of the university, providing a constant source of nutrients for the leapfrog development of the university. It can be seen that the integration and development of universities and cities is a process of mutually beneficial cooperation, two-way empowerment, and two-way service between universities and cities, which is characterized by interactive two-way nature. From the macroscopic point of view, a stable two-way interactive flow is formed between the two systems of university and city, which is mainly reflected in the continuous flow and exchange of capital, technology, information, human resources, and culture between the two systems, and both sides strive to find the right integration and power point in spatial layout, talent cultivation, collaborative innovation, and cultural leadership, to realize the win-win development of university and city with two-way empowerment and two-way service. Microscopically, the development of various high-tech industries, financial services, transportation, medical security, housing reform, and community construction within the city system provides important social security for the university's schooling needs and also put forward higher level and multi-level service demands for the university's social services. By focusing on the advantages of disciplines within the university system, and taking into account applied and development research while emphasizing basic research, the university system continues to enhance its role in serving the promotion of scientific and technological innovation and transformation of scientific and technological achievements in the city, forming a two-way synergistic innovation service system with the city innovation system, and focusing on the major needs of the city development, actively integrating with the subsystems of the city system through the integration of industry and education, science and education, etc. It also promotes the formation of different types and levels of diversified service modes by combining the university's characteristics and forms two-way empowerment development with the city in political, economic, and cultural fields.

2.3. DATA MINING TECHNOLOGY ALGORITHMS

In the same data mining process, the process mainly includes three steps: data preprocessing, model building, and model evaluation, and the commonly used models

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are the clustering algorithm and neural network algorithm. Clustering analysis is the analysis process of grouping objects into multiple clusters composed of similar objects, which is an important branch of data mining technology. The clustering process is based on certain attributes of the data, and the data is divided into different categories or clusters by setting rules, and the data within the same cluster are more similar, and the data within different clusters are more different. Cluster analysis is a kind of unsupervised learning, and no classification or grouping information in each cluster indicates the class of data. In data mining techniques, neural network algorithms can efficiently mine the correlation between one or more sets of data and the target data based on a large amount of known data. Therefore, it is often widely used in scenarios such as data prediction or analyzing the influence weight of multiple groups of data on a single group of data, while the neural network algorithm is selected for data mining techniques in this study, and its main model is as follows.

$$\sigma(Z) = \frac{1}{1 + e^{-Z}} \tag{1}$$

Where $\sigma(Z)$ is the sigmoid excitation function, Z represents the input data of the neuron, and the input in the sigmoid neuron can be any value between 0 and 1, from which the excitation function of the Sigmoid neuron can be derived, as in equation (2).

$$f(x) = \frac{1}{1 + e^{-(wx+b)}} \tag{2}$$

where denotes the weight value corresponding to each input data and is the threshold value of that neuron.

When using a neural network, it is necessary to train first and adjust the weight threshold to make the network adapt to the correlation between data and achieve the purpose of prediction. Training includes the following steps: (1) Neural network initialization. The number of nodes in each layer of the network is determined according to the system input and output (x, y), the weight threshold is given an initial value, and the excitation function $f(x)$ is given. Calculate the output of the hidden layer. Based on the input data x, the weights w_{ij} between the input layer and the hidden layer, and the hidden layer threshold a_j, the hidden layer output H is calculated.

$$H_j = f\left(\sum_{i=1}^{n} w_{ij} x_i - a_j\right) \tag{3}$$

Calculate the output value of the output layer. Calculate the neural network output value based on the hidden layer output H, the weight between the hidden layer and the output layer as w_{jk} and the threshold of each neuron in the output layer as b_k.

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$$O_k = \sum_{j=1}^{t} H_j w_{jk} - b_k \quad (4)$$

According to the neural network output value O and the actual value Y, the error of each neuron in the output layer is calculated e.

$$e_k = Y_k - O_k \quad (5)$$

3. ANALYSIS AND DISCUSSION

The interaction mode of university science and technology innovation and urban new industry development not only reflects how the two sides interact but also reflects the different interests of each subject in the interaction. On the one hand, we should analyze the practice subjects and practice elements of the interaction mode, and grasp and sort out the interaction mode of China on a deeper level from the whole, on the other hand, we should actively study the interaction cases of foreign universities' science and technology innovation and urban emerging industry development, and explore the interaction law and compare the experience through the method of comparative research, so this study takes Dongguan city as an example and uses data mining technology to fully explore the Therefore, this study takes Dongguan City as an example and uses data mining technology to fully explore the path of integration and development of city and university.

3.1. UNIVERSITY-COMPANY PROJECT COOPERATION

The ultimate goal of the cooperation between universities and urban emerging industries is to transform science and technology into real productivity and obtain economic benefits. In the operation process of the interaction mode between the two sides, the selection of projects determines to a certain extent the participation of the interaction subjects and the way of interaction. Generally speaking, the government tends to play the role of macro regulation and actively guides universities and emerging enterprises to participate in pre-collaborative innovation through organizing science and technology project exchange meetings and other means. However, based on the difference in starting points and interest demands of different subjects, the cooperation rate of the project cannot be raised, or the cooperation is interrupted halfway, which makes the project cooperation effect not reach the expected goal, and the possibility of achieving cluster innovation development is smaller and the cluster effect is insufficient. The said R&D activities are mainly divided into three categories: basic research, applied research, and experimental development, which is an act of innovation and novelty in one by using scientific methods to generate new knowledge or create new applications, and it has a wide range of cooperation objects. The project cooperation between universities and enterprises in Dongguan is shown in Table 1 and Figure 1.

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Table 1. Number and distribution of project topics

Projects	Number of subjects	Inputs (hundred people)	Investment in R&D (ten million yuan)
National Science and Technology Projects	285	883	120
Local Science and Technology Projects	438	548	11
Other Science and Technology Projects	145	315	17
Self-selected Science and Technology Projects	168	164	4.5
Projects entrusted by enterprises	53	107	4.2

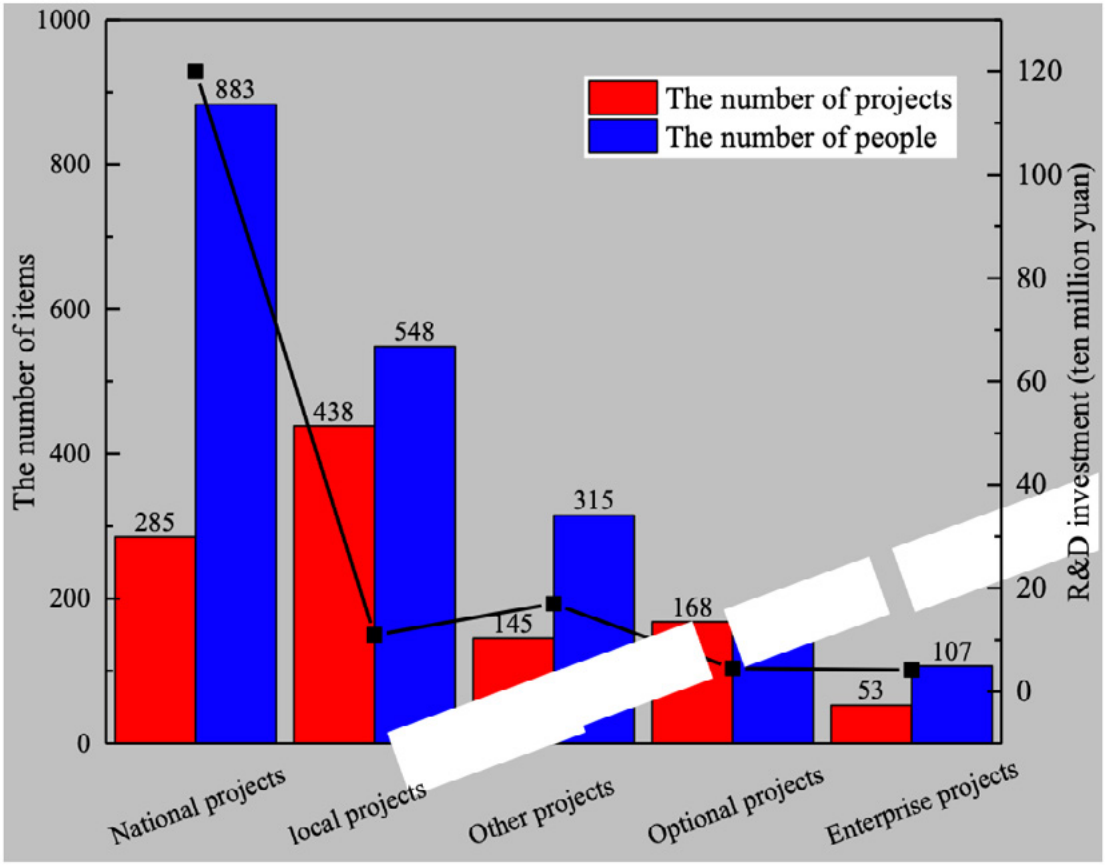

Figure 1. The situation of each index of the subject project

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The analysis of the data shows that, firstly, the participation of enterprises in R&D activities entrusted by science and technology projects is low, accounting for only 4.9% of the overall projects, indicating that enterprises, as the main body of applied and experimental research, have less demand for cooperation in producing new products and conducting new R&D. Secondly, the participation of domestic universities is also low, indicating that, as one of the main bodies of basic research, the original intention of universities is to advance scientific and technological knowledge and Not much consideration is given to long-term economic benefits or social benefits. In summary, universities are not committed to applying their scientific and technological achievements to solve practical problems or to transfer them to sectors dedicated to their application, such as emerging enterprises, and similarly, enterprises are not willing to seek partners, such as universities, thus resulting in a situation where the concept of cooperation between the two sides lags and project cooperation is not strong, and the chances of cluster innovation development resulting from the clustering of projects are reduced.

3.2. R&D INVESTMENT

The characteristics of new urban industries vary at different stages of development, but they all grow and develop gradually in the midst of various unknown risks. After the birth of scientific and technological achievements, new products begin to transform from theories and concepts to physical experiments. Faced with the unknown market prospect at this stage, traditional venture capital institutions such as banks and insurance companies tend to adopt a wait-and-see policy first, preferring well-known enterprises or enterprises that have reached a mature level of development in the selection of investment targets. At the same time, due to the incomplete relevant safeguard policies, the mismatch of the legal system of venture capital, the lack of professional investment talents, and the fragile exit mechanism of venture capital, the current venture capital system is slightly single, which is unable to guarantee the normal funding operation of the interaction between university science and technology innovation achievements and the market of emerging industries in the city, the research expenditure in Dongguan in recent years is shown in Table 2 and Figure 2.

Table 2. Expenditures of funds by year (billion yuan)

Year	Basic Research	Applied Research	Experimental Development
2016	0.62	3.1	11.06
2017	0.73	3.57	11.45
2018	0.82	3.68	12
2019	1.12	3.93	12.23
2020	1.32	4.02	12.65
2021	1.43	4.63	13.27

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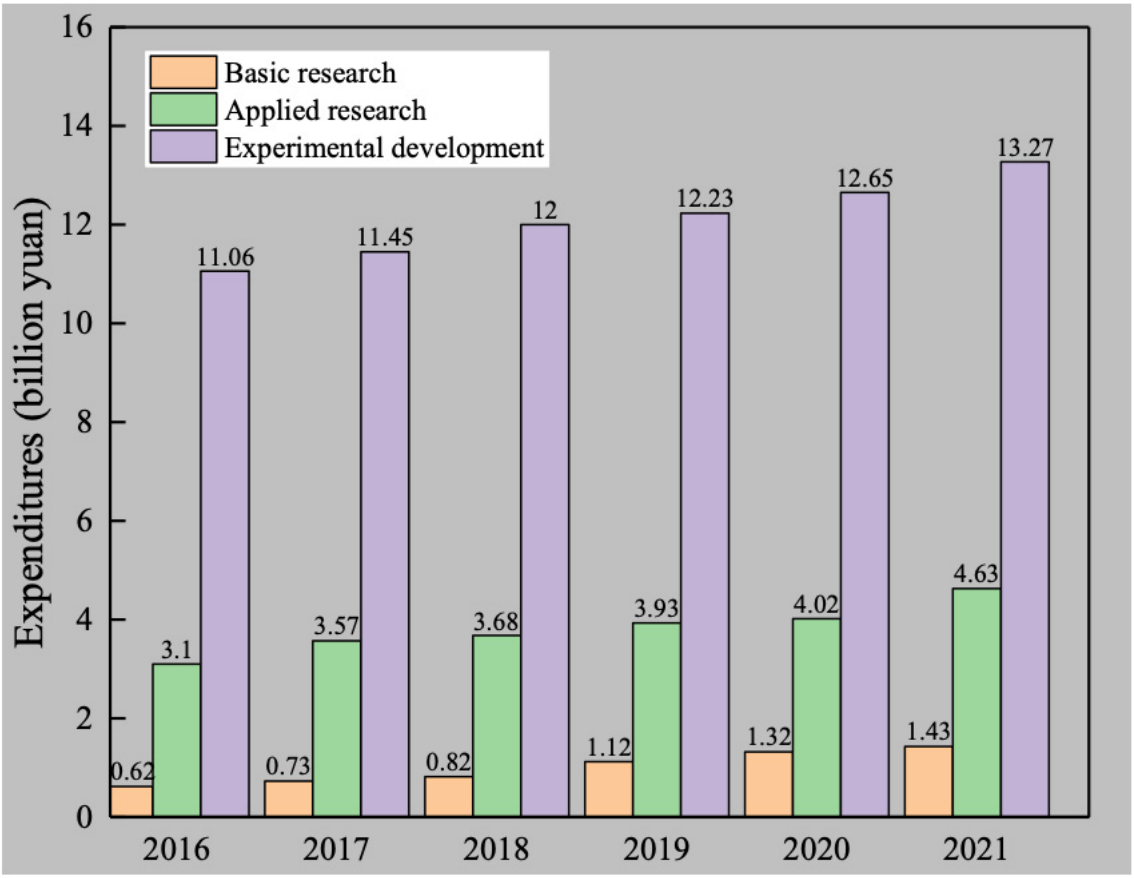

Figure 2. Expenditures

As can be seen from the graph, the funding expenditures become progressively larger over time, while the funding for experimental development accounts for a relatively large share, accounting for 68.65% of all funding expenditures by 2021. For the integration of universities and cities, regardless of the mode of interaction, its smooth operation or not is inseparable from financial support. The scientific and technological innovations born in Chinese universities face the problem of shortage of funds, whether in the early stage of research and development, in the middle stage of technology diffusion, or the late stage of industrialization. Although universities have been supported by special state funds in establishing university science and technology parks, science and technology innovation bases, business incubators, and even in the process of matching with enterprises, they have played a role in supporting the transfer and diffusion of technology. However, in recent years, investment in R&D in China is still at a low level and the proportion of GDP has been low, as shown in Table 3 and Figure 3.

Table 3. Comparison of R&D spending to GDP volume by country (%)

Year	China	American	Japan	France	Germany
2017	1.51	2.75	3.35	2.20	2.76
2018	1.76	2.55	3.30	2.24	2.85
2019	1.87	2.67	3.51	2.23	2.78
2020	1.98	2.78	3.67	2.22	2.87
2021	2.01	2.84	3.48	2.21	3.89

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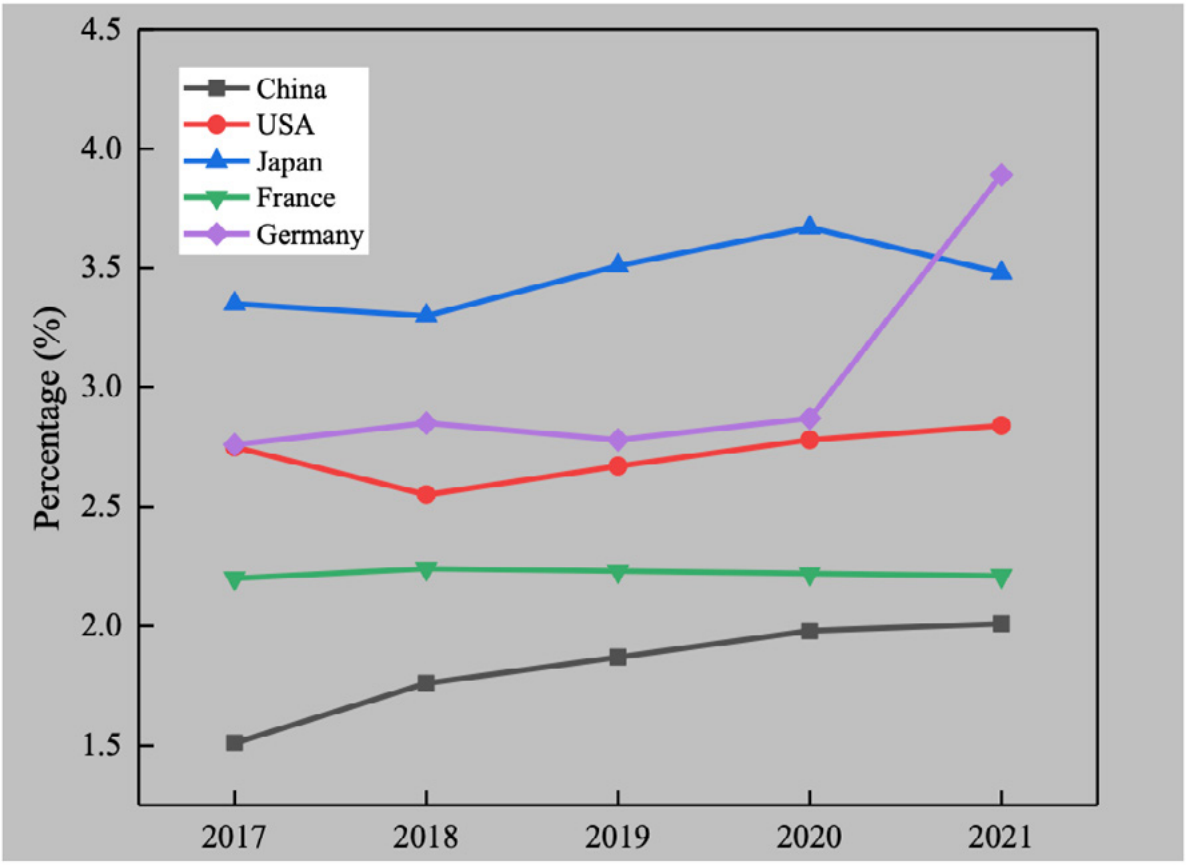

Figure 3. Comparison of R&D expenditure as a share of GDP

As shown in Chart 3 and Figure 3, the Chinese government's investment effort in R&D funding has developed from 1.51% in 2017 to 2.01% in 2021, which is an increasing trend but clearly lags behind by a large margin compared to developed countries such as the United States, Japan, Germany, and France. Looking closely at the data for 2017-2021, it is easy to see that the level of investment that China will reach in 2021 has been put in place or even exceeded by many in countries such as the United States a few years ago. The limited investment in R&D in China, which cannot meet the actual needs of the market, objectively hinders the transformation of university science and technology innovation results into urban emerging industries.

3.3. RESEARCH RESULTS

Through data mining techniques, it is found that the conversion of university science and technology innovation results is an important way to build a cooperation platform between universities and urban emerging industries, and is also the key to the smooth operation of each interaction model, and the study takes the high or low conversion rate as an important indicator of the value of science and technology activities. A lower conversion rate of science and technology innovation results causes waste of university science and technology innovation resources on the one hand, and affects the timeliness of enterprises' access to the latest science and technology innovation results on the other, leading to problems such as slow product upgrading and weak market competitiveness of urban emerging industries. In addition, an

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important manifestation of scientific and technological innovation results is the patent application, the development of new products must first pass patent approval, and then can be put into production and then transferred to the market operation, so the efficiency of the patent is also one of the important indicators to determine the value of scientific and technological innovation activities. In the past five years, although the Dongguan government has encouraged universities and enterprises to actively apply for patents under the premise of scientific and technological innovation, the number of applications and authorizations has been increasing year by year, as shown in Table 4 and Figure 4.

Table 4. Patent applications and grants

Year	Patent Application	Patent Licensing	Authorization rate (%)
2017	25680	15901	61.9
2018	27803	16553	59.54
2019	33620	21740	64.66
2020	44826	22967	51.24
2021	49726	25523	51.33

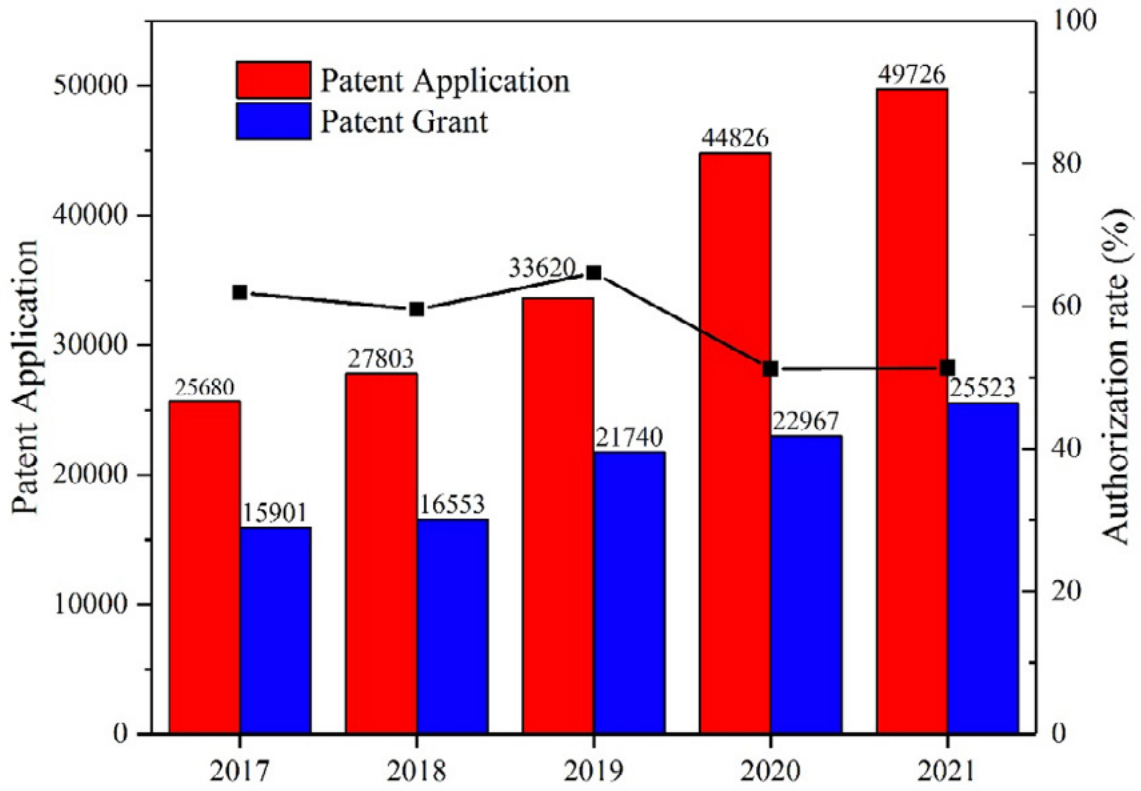

Figure 4. Patent Applications and Grants

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The above analysis data show that the results of scientific and technological innovation often do not match the market demand. The reasons for this are mainly the following: firstly, the universities' awareness of the transformation of scientific and technological innovation results is weak, and the purpose of scientific research is slightly single; secondly, in the process of the patent application, the situation of emphasizing quantity rather than quality is very common; again, compared with the United States and other countries with the mature transformation of scientific and technological achievements, the incentive mechanism of scientific and technological innovation results in China has great problems, focusing on spiritual incentives such as title evaluation, which is difficult to mobilize teachers and student's motivation. As can be seen from Table 4 and Figure 4, the growth of patent efficiency rate, however, is not obvious, and even appears to regress. 61.9% of patent efficiency rate in Dongguan City in 2017, with signs of decline in 2018 and 2020, and a slight turnaround in 2019, but still lower than in 2017.

The patents and emerging technologies developed by universities, as important research results, have to be applied in actual production life to play an important role. The patents and technology transfer of universities in Dongguan in recent years are shown in Table 5 and Figure 5.

Table 5. Patents and Technology Transfer in Higher Education Institutions

	Technology transfer (yuan)		Patent assignment (yuan)	
Year	Amount sold	Actual income	Amount sold	Actual income
2013	3894	2913	9229	8460
2014	111345	71911	15102	7855
2015	131805	75437	20109	12663
2016	102149	64994	18491	10150
2017	97301	66282	27471	14855
2018	62149	72423	44766	17665

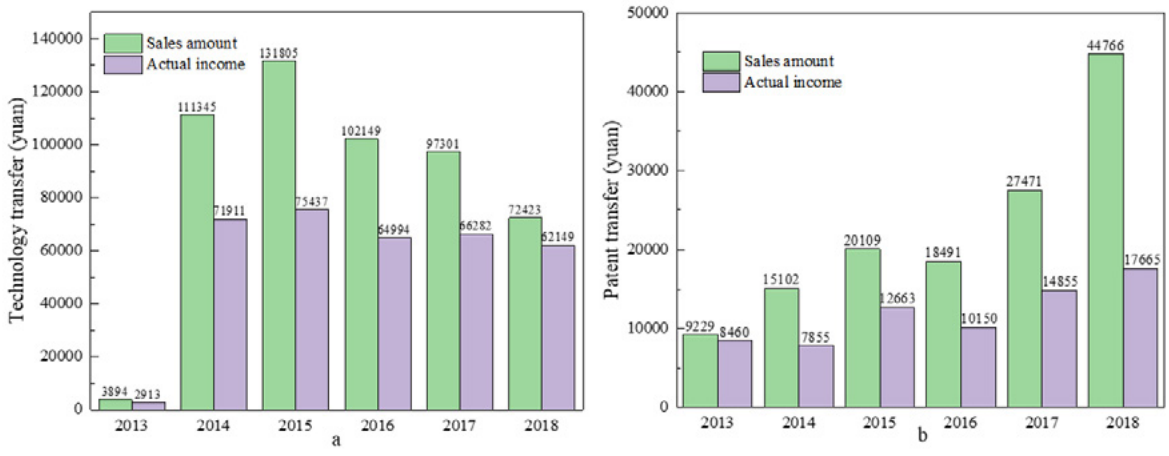

Figure 5. Patents and Technology Transfer

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Where Figure a shows the transfer of university technology and Figure b shows the transfer of patents, it can be seen through Figure 5 that for the transfer of university technology, its sales gradually decreased from 2015, but the overall change in actual income is small, which shows from the side that with the continuous research and the gradual development of high precision technology, resulting in a significant increase in the amount of transfer of individual technologies, thus ensuring sufficient revenue. For patent transfer, from 2013 to 2018 in an upward trend, the actual income increased from 8460 to 17665.

3.4. URBAN INDUSTRIAL STRUCTURE

Under the progress of the integration and development of the university and the city, the gross product of Dongguan City is shown in Table 6 and Figure 6, in which Dongguan achieved a gross regional product of 108.554 billion yuan in 2021, an increase of 8.2% over the previous year. Among them, the value added of primary industry is 3.466 billion yuan, an increase of 11.8%, contributing 0.4% to the growth of regional GDP; the value added of the secondary industry is 631.941 billion yuan, an increase of 10.5 %, contributing 73.0% to the growth of regional GDP; the value added of tertiary industry is 450.128 billion yuan, an increase of 5.1%, contributing to the growth of regional GDP 26.6%, overall strong economic development, thanks to the city's support and assistance to universities, the comprehensive quality of various undergraduate and higher vocational institutions in Dongguan has also continued to progress and always maintained a strong momentum of development.

Table 6. The growth rate of gross production

Year	Gross production value (billion yuan)	Growth rate (%)
2016	7260.92	8
2017	8079.2	8.3
2018	8818.11	7.5
2019	9474.43	7.4
2020	9756.77	1.1
2021	10855.4	8.2

https://doi.org/10.17993/3ctecno.2023.v12n2e44.163-182

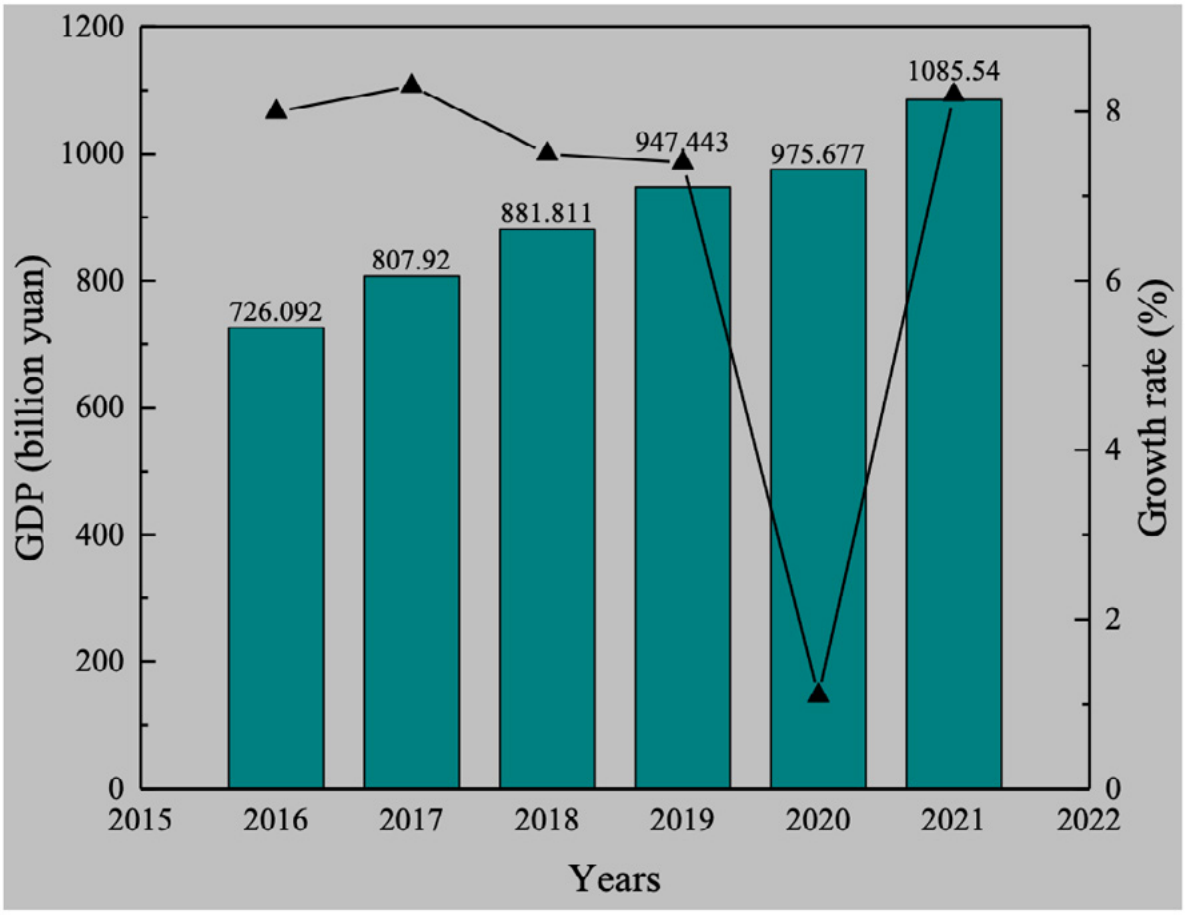

Figure 6. City GDP and Growth Rate

4. CONCLUSION

In the context of a knowledge-based economy, universities, and enterprises, as important subjects in the interactive development of university science and technology innovation and new industries in cities, realize the interaction mode of interdependence, close connection, and seeking a win-win situation, which is of great significance to the in-depth implementation of the concept of integration of industry and education and the construction of national innovation system. This paper analyzes the cooperation between urban development and various universities in Dongguan City with data mining technology as the research method and proposes suggestions for the integration development path, the specific research findings are as follows:

1. The interconnection and development between urban enterprises and universities are not close enough. Currently, urban enterprises in China commission fewer science and technology projects to participate in R&D activities, accounting for only 4.9% of the overall projects, indicating that enterprises, as the main body of applied and experimental research, have less demand for collaborative production of new products.

https://doi.org/10.17993/3ctecno.2023.v12n2e44.163-182

2. Through data mining technology to analyze between universities, enterprises, research institutions, and the government of Dongguan City, based on integration and innovation, to build a model of the inner action mechanism of regional universities and the development of science and technology innovation in the city, and analyze the path selection relationship between technology trading and integrated operation mode, the results show that with continuous investment and research and development each university's patent application and technology transfer increase in 2021 No., Dongguan City applied for a total of 49,726 patent applications, 25,523 authorized, with an authorization rate of 51.33%.

3. The scientific and technological research and development achievements of the university will act on the development of the city, promote the transformation and upgrading of urban industries and improve the competitiveness of the city. The research results show that the GDP of Dongguan City in 2021 showed strong momentum, achieving a regional GDP of 108.554 billion yuan, an increase of 8.2% over the previous year, and the rapid development of the city will also drive the university to progress together, forming a good closed-loop development.

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