
# Insights on China New Infrastructure

Thematic Investment Analysis based on Alternative Data

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GTCOM-US

# Statement



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## *Background*

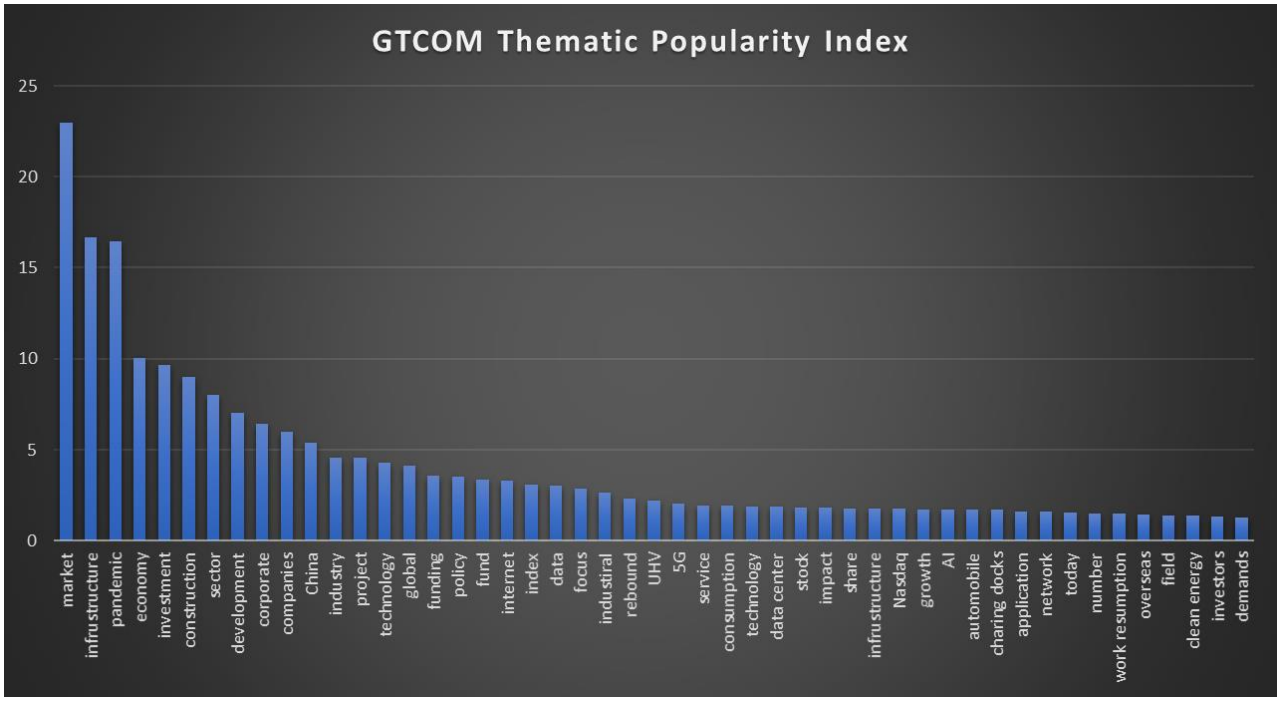
The **New Infrastructure Plan** is not so new. The Chinese government released the stimulus plan since December 2018. However, it becomes a hot topic this year due to the impact of COVID-19 on economic growth. As the National Bureau of Statistics released on April 20, 2020, the GDP of China in Q1 2020 shrank 6.8%, which is the first time in decades. As a significant part of the efforts to boost the economy, each level of government, from the Central to provincial and even to municipal level, introduces the new infrastructure project plan and corresponding financial plan.

The **New Infrastructure Plan** brings investment opportunities in both the primary and secondary markets. To help our clients capture these opportunities, GTCOM-US utilizes our alternative data capabilities to create both quantitative strategies and fundamental analysis. In Part I of this report, we performed fundamental analysis on some popular themes of the New Infrastructure Plan. In Part II, we introduced how to help clients create their portfolio or evaluate and optimize their current thematic portfolio. At last, we created thematic quantitative strategies related to **the New Infrastructure Plan.** These quantitative strategies can help clients to develop or optimize their portfolio and even set up better timing strategies. This report will deepen (strengthen) the understanding of the market for both overseas buy-side and sell-side.

# *PART I: Insights from Fundamental Analysis*

The New Infrastructure Plan covers many different industries / sectors, including the popular ones such as 5G telecom, AI, data center, ultra-high voltage transmission, and so on. In order to capture the current market hotness, we use our Data Filter and Analysis platform to extract news and social media related to the topic and developed our Popularity Index combining the media occurrence and sentiment score of certain keywords.

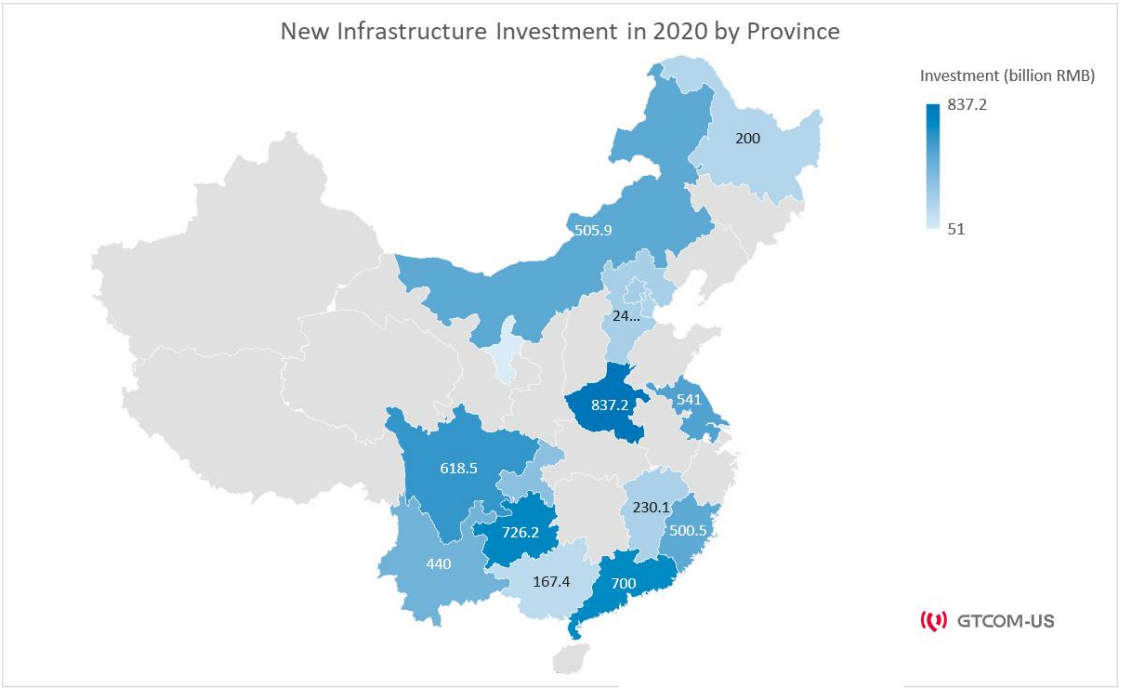
Based on our Thematic Popularity Index, we analyzed the government policies and mainly focus on the top three sectors that will benefit from the new infrastructure stimulus plan: data center development, charging dock growth, and 5G progress.




## 1. Government Policies

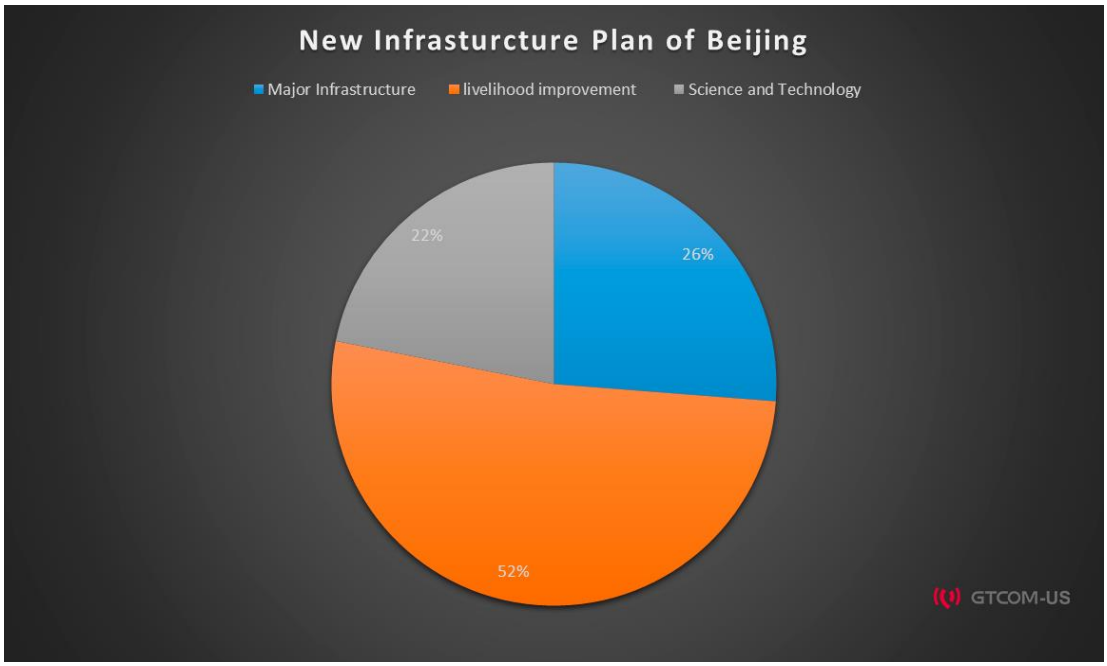
Using our NLP technologies, we keep tracking the government policy release and organize them by provinces and sectors.

As of 04/25/2020, government of 19 provinces has introduced 22,000 projects that will initiate within 2020 with a total investment amount of 7.6 trillion RMB.




**Distribution of Government Policies**

Take **Beijing** as a detailed example. The municipal government introduced the "Triple 100" plan that it will promote 100 projects in each of the traditional infrastructure (highway, railroad, airport), living quality improvement (education, medical service, culture, and entertainment), and science and technology areas, with a total investment of 252.2 billion RMB.



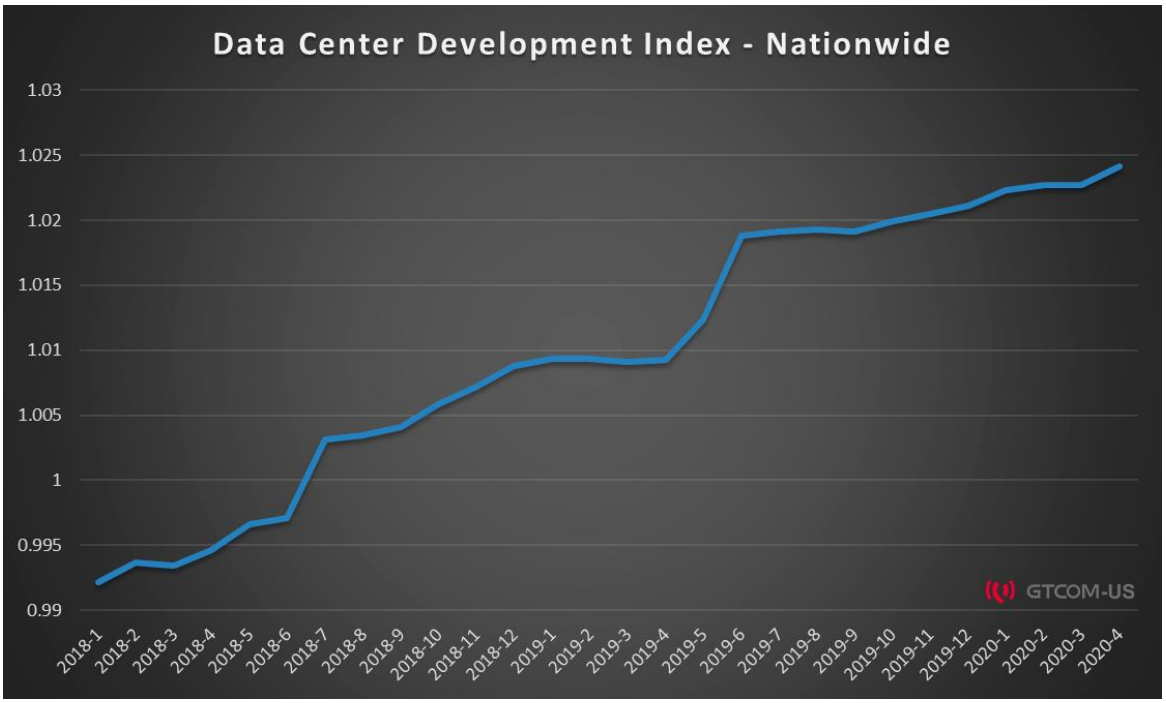

**Regional New Infratructure Analysis(Beijing)**

## 2. Analysis of Specific Themes

### *2.1 Data Center*

The data center is defined as the infrastructure of the all-digital economy. Provincial governments have introduced or are introducing plans to accelerate the digital transformation of operation, which requires more local IDCs to support the network. Furthermore, provinces such as Guizhou has announced the Big Data strategy since 2016. To track the data center development situation, we analyzed different data available, from the growth of IP addresses within each province to the fundraising status of startup firms in the field.

From the chart, we could see that the data center growth by provinces, here we set the average monthly growth rate in 2018 as the benchmark and combining our popularity indicator, we calculated the index to reflect the change of data center scale.



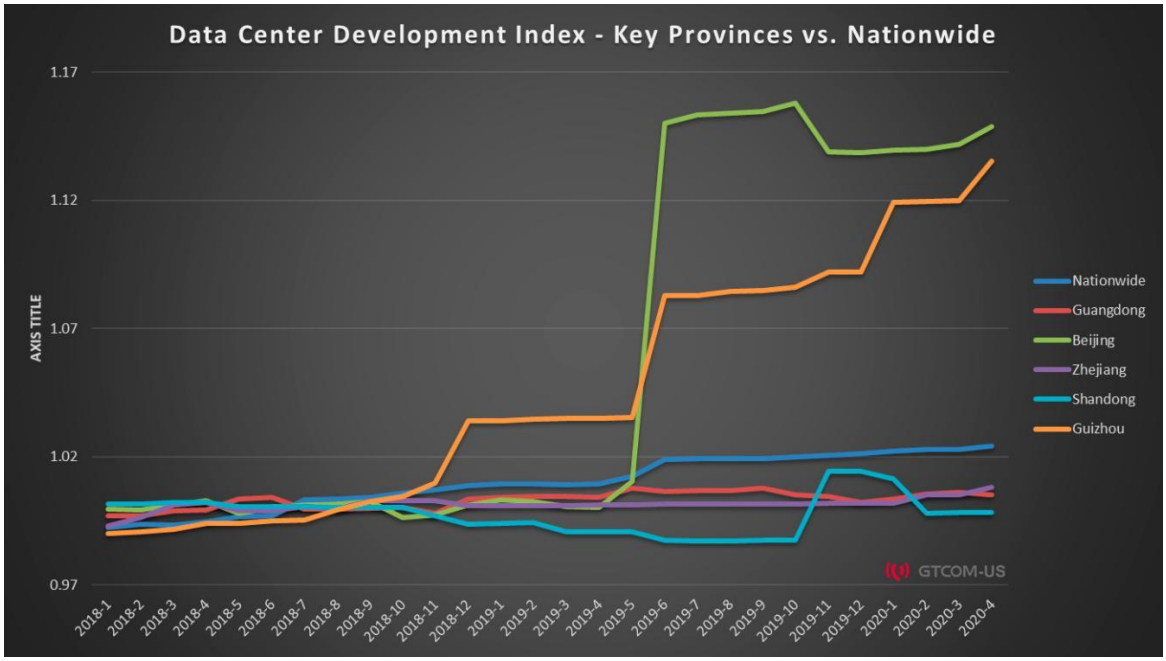

**Data Center Development Index(Nationwide)**

There are several vital provinces investors may look into. One is **Guizhou**. Although local government has planned to support the big data industry as early as in the year 2015, the real development began in 2018. Since Apple shifted the iCloud operation within mainland China to Guizhou in 2018, the data center sector experienced explosive growth. As our index shows, the growth rate in Guizhou jumped from 2% below the national average to 10% higher since the end of 2018 and is only slightly slower than **Beijing**. Due to the abundant hydropower and, therefore, the low cost for electricity, we believe that Guizhou will keep the current pace in the foreseeable future.

Another city that experienced a high growth rate is **Beijing**. As the center of the internet industry in China, Beijing sits the most famous internet companies in China, which reflects the high demand for cloud and data center services. As we could see from our chart, Beijing has an explosive growth of IDC IP addresses since May 2019 and kept a high rate even during the pandemic. New internet giants such as **ByteDance** and **Meituan** are all expanding their cloud services, and Beijing, as the capital city of the country, is a must for all players.

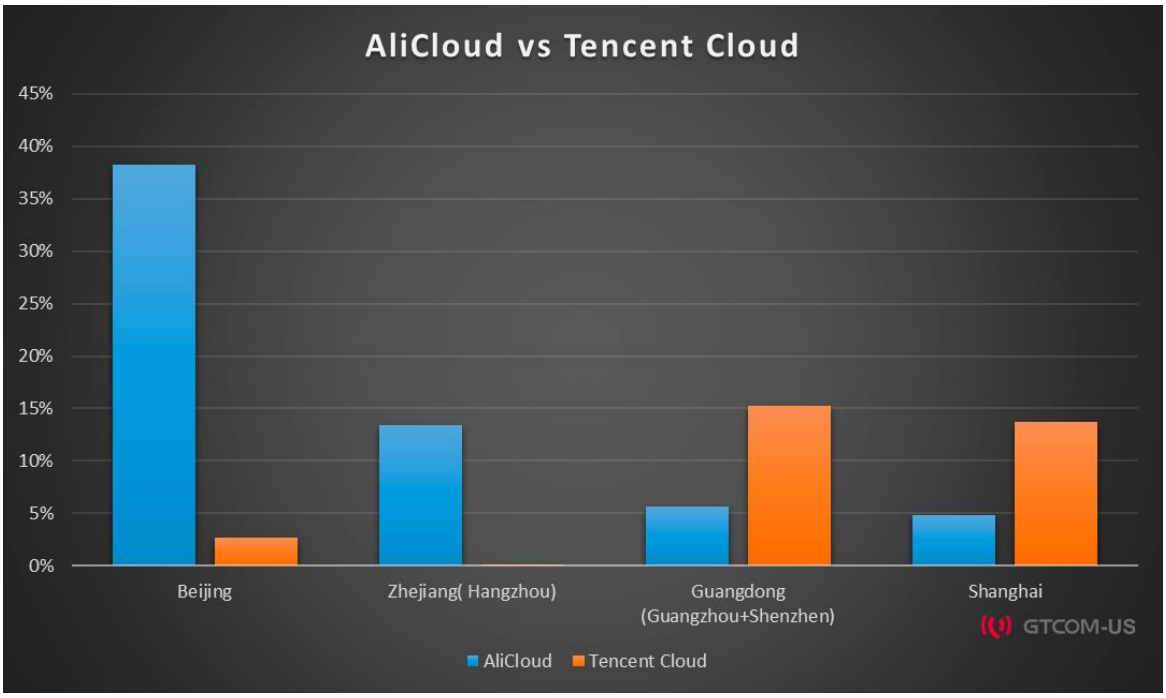
The last key province is **Shandong** Province. In 2019, the provincial government introduced the **Digital Shandong 2020 Plan,** which will accelerate the digital transformation of the government

operation, and connect all administrative activities to the cloud server. As the chart shows, there is an increase in the data center scale in Shandong from November 2019 to January 2020. Although the trend discontinued during the Covid-19 pandemic, we believe that the data center sector in Shandong will embrace another wave of growth.



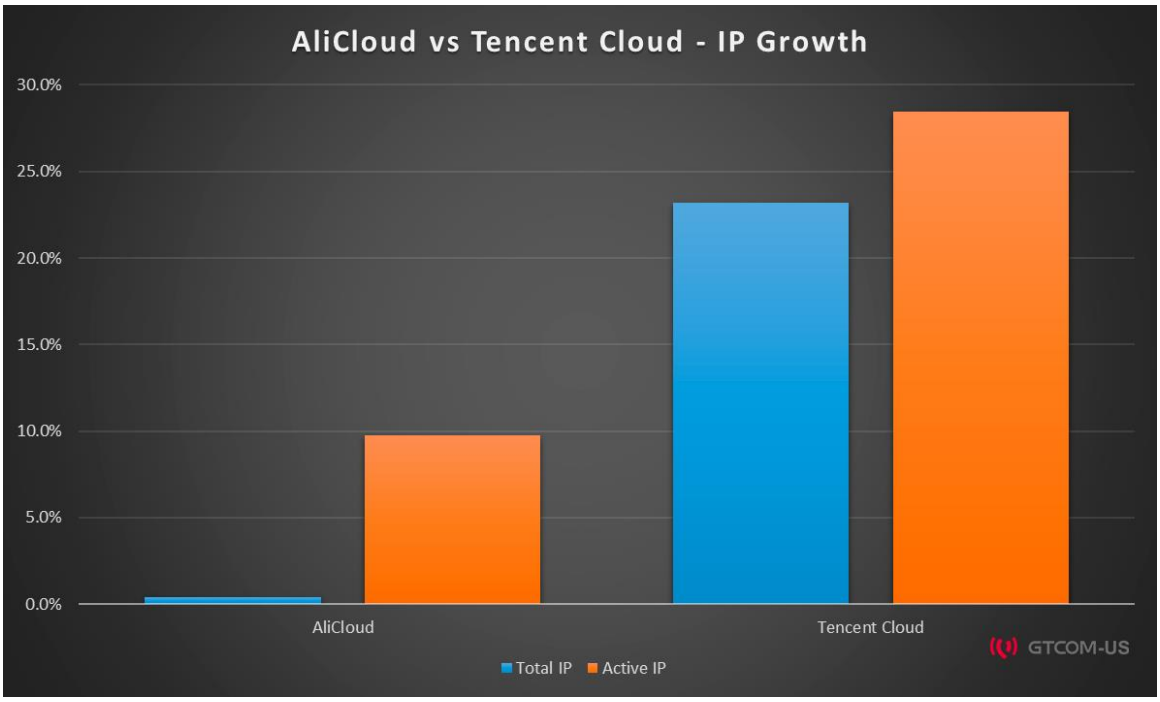

**Data Center Development Comparison(Region level)**

Last, take the top 2 domestic companies as an example. For each of **AliCloud** and **Tencent Cloud**, we pick the top 4 provinces where they have most IP addresses and compare them with the total IP addresses they own as of 05/31/2019. As in the graph, we can see that **Beijing** is a pivotal city for AliCloud, where about 38% of its total IP addresses in mainland China are in Beijing, while Tencent only has 3% of its total IP addresses in Beijing. **Hangzhou** is another important vital base for **AliCloud** since it's the HQ of the company. Comparatively, **Tencent** is more focused in **Southern China**. **Guangzhou** and **Shenzhen** (the HQ of Tencent) together take 15% of its total IP addresses, and **Shanghai** alone takes another 14%.

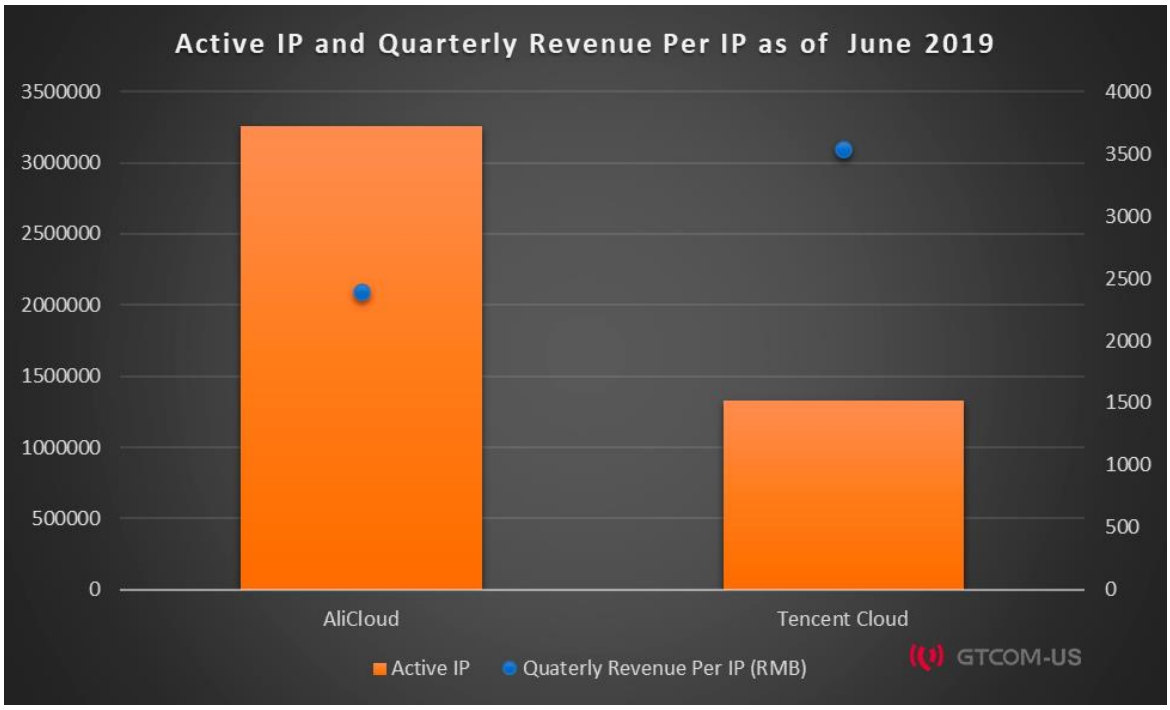



**Data Center Development Comparison(company leve)**

Furthermore, we compared the total IP address growth and active IP growth of the two companies from 2H 2018 to 1H 2019. As the result shows, the total IP addresses registered by AliCloud increased by 0.42%, and the active IP increased by 9.75%; meanwhile, the corresponding number for Tencent cloud is 23.18% and 28.48%. According to the financial report by each company, the quarterly revenue from Cloud Service in Q1 2020 was 8.878 billion RMB for AliCloud and 4.7 billion RMB for Tencent Cloud. Combining our active IP data, we could draw the conclusion that the average quarterly revenue per active IP address for AliCloud was 2392 RMB and 3543 RMB for Tencent Cloud.

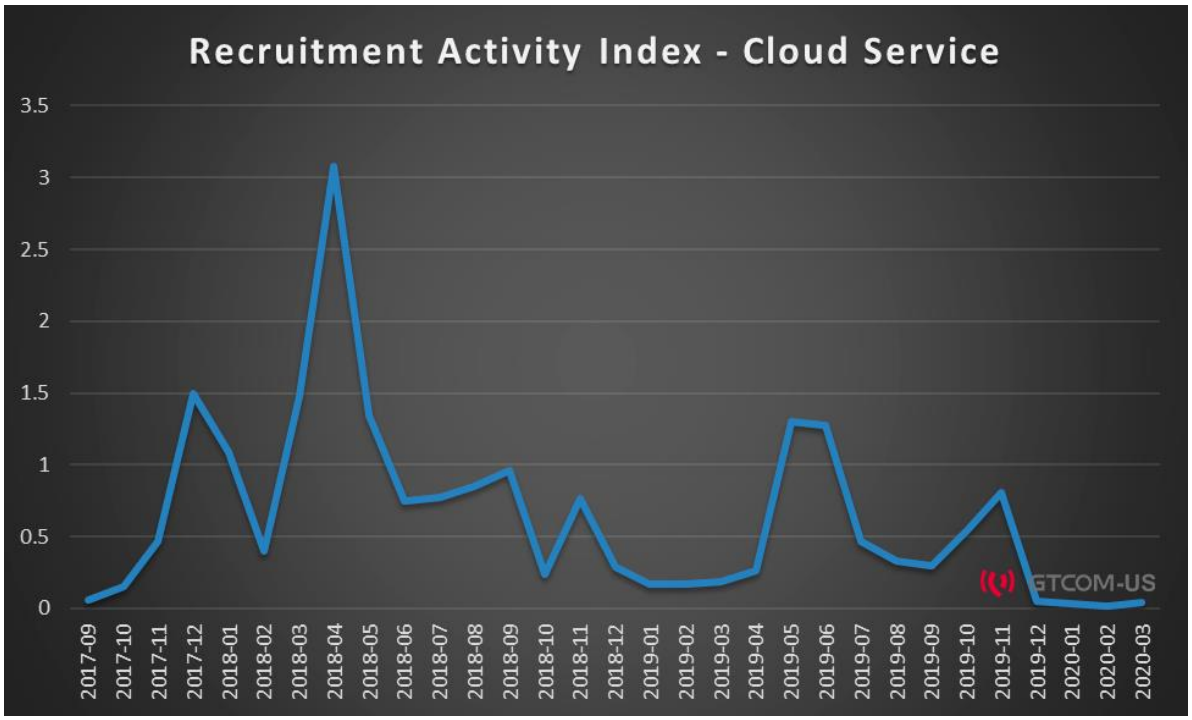


**IP Growth Comparison**




**Comparison of Active IP AND Quarterly Revenue Per IP**

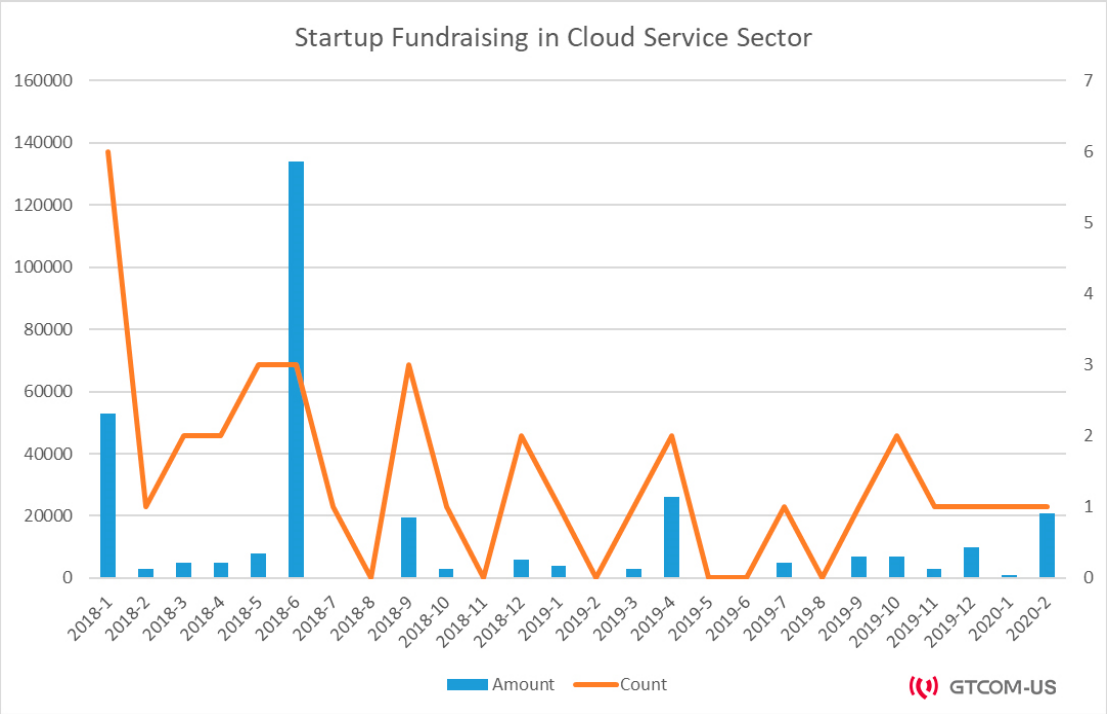
Through the **recruitment activities index** of China A-share public listed firms, we can see that the cloud service sector experienced a hike in early 2018; and then another smaller growth in May and Jun 2019 after the New Infrastructure plan released.




**Recruitment Activity Index-Cloud Service**

Last, from the private sector, we could see that the main fundraising activities occurred during 1H 2018, where both the amount and fundraising rounds peaked. Although the cloud service sector is a

highly capital-intensive field, there are still rooms for smaller players. For example, startups such as Zenlayer with new edge-computing concepts still draws the attention of venture capitals.

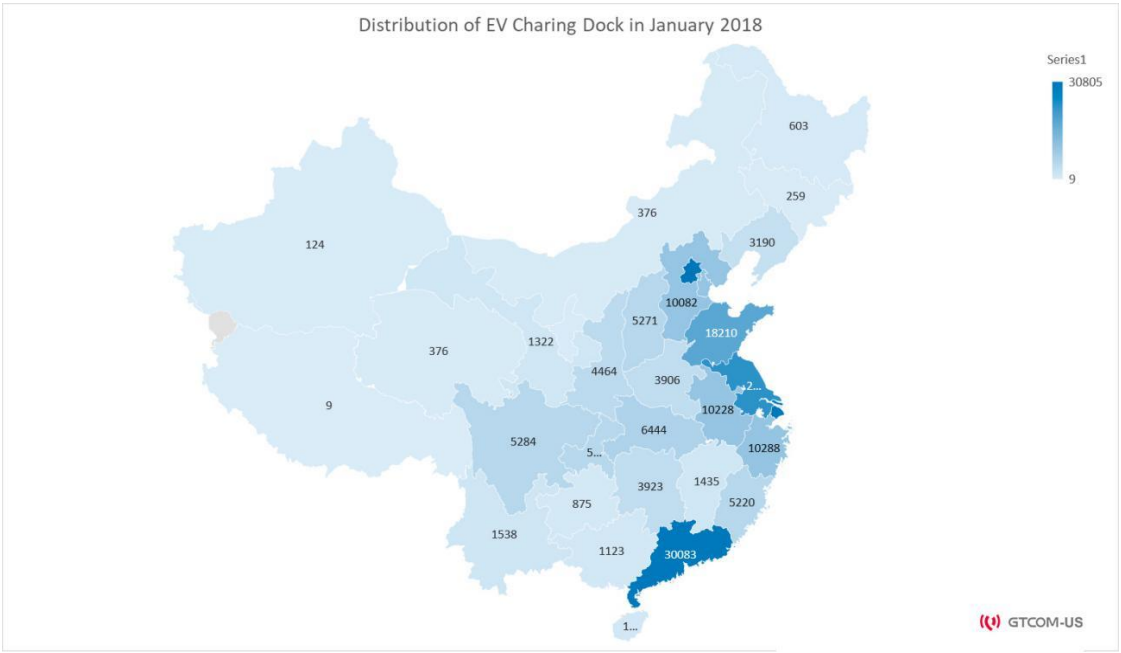



**Startup Fundraising in Cloud Service**

## *2.2 Charging Dock*

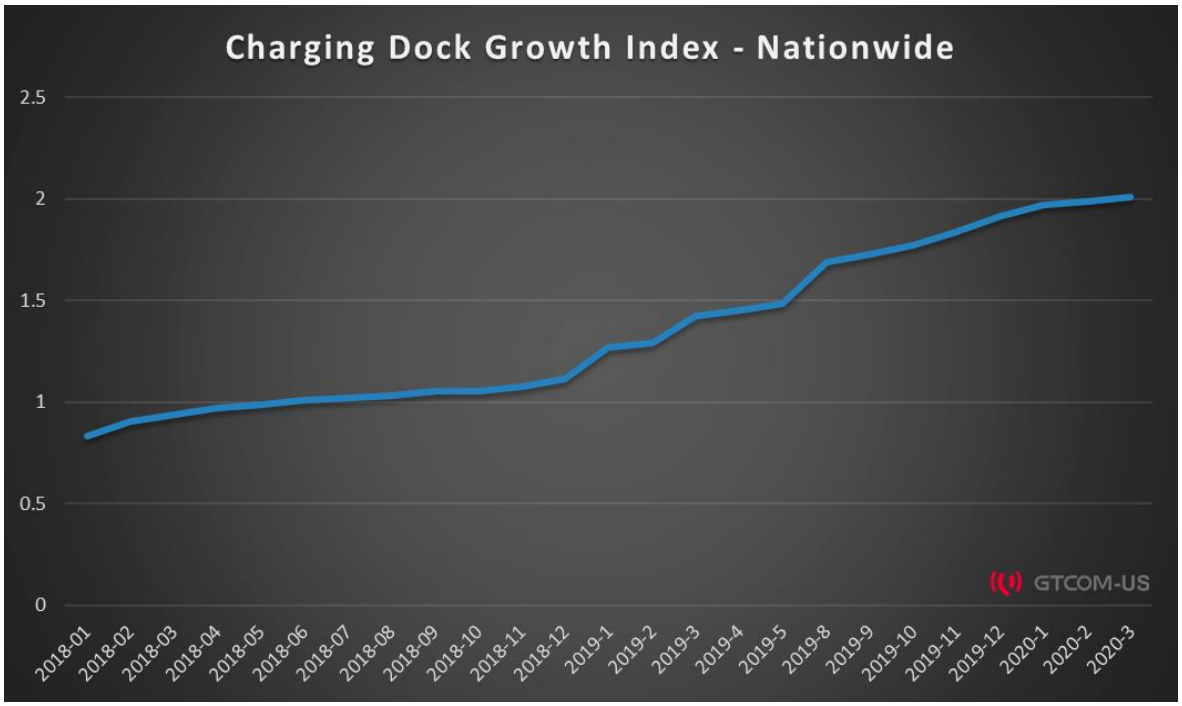
The electric car charging dock is another significant section of the infrastructure as electric car sales have surpassed 1.2 million units per year in 2019.

As of March 2020, there are 541,657 public EV charging docks in total nationwide. From the heat map below, we could read that the spread of charging docks is uneven. Six Coastal provinces, including **Beijing, Shanghai, Jiangsu, Zhejiang, Shandong, and Guangdong,** takes approximately 58% of all charging docks.

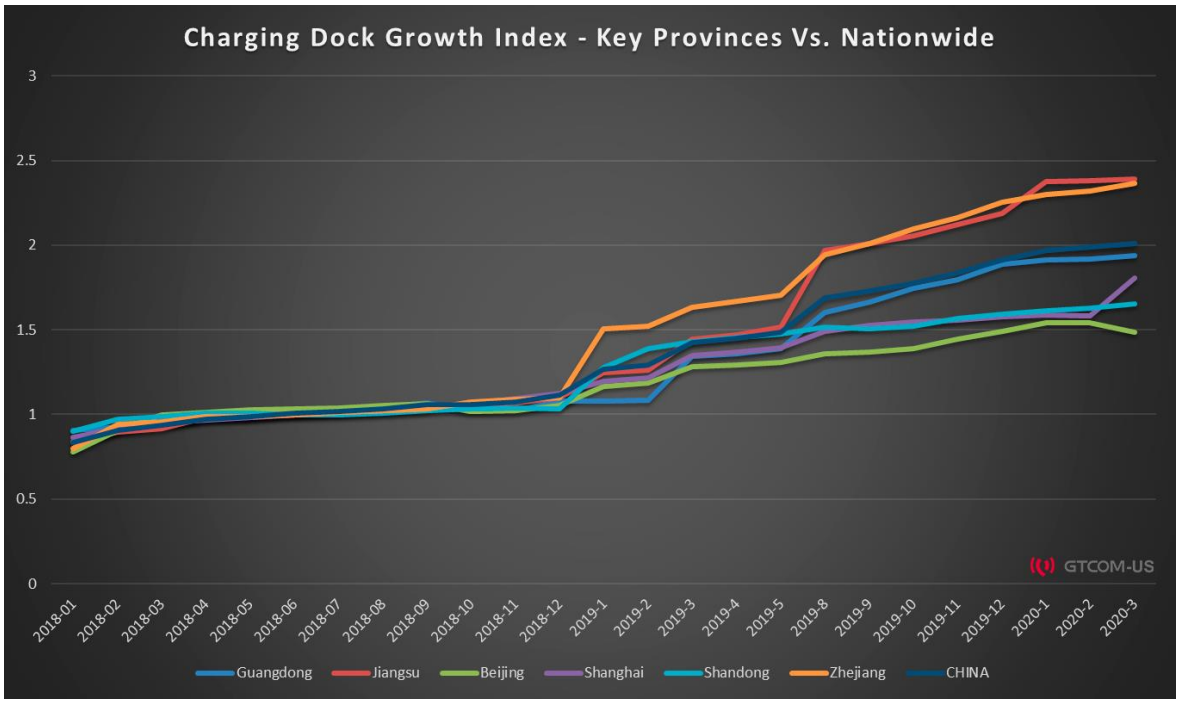




From the other angle, we calculated the growth index of charging docks by province, so that we could compare the growth rate among different provinces. Again we set the 2018 average monthly growth rate = 1 as the benchmark. We can see that among the top 6 provinces in terms of the number of charging docks, the growth rate in **Jiangsu** and **Zhejiang** is above the national average; the rest are below the national growth rate. Meanwhile, we could see that all provinces experienced jumping growth after December 2018. We believe that the New Infrastructure plan has helped boost growth.

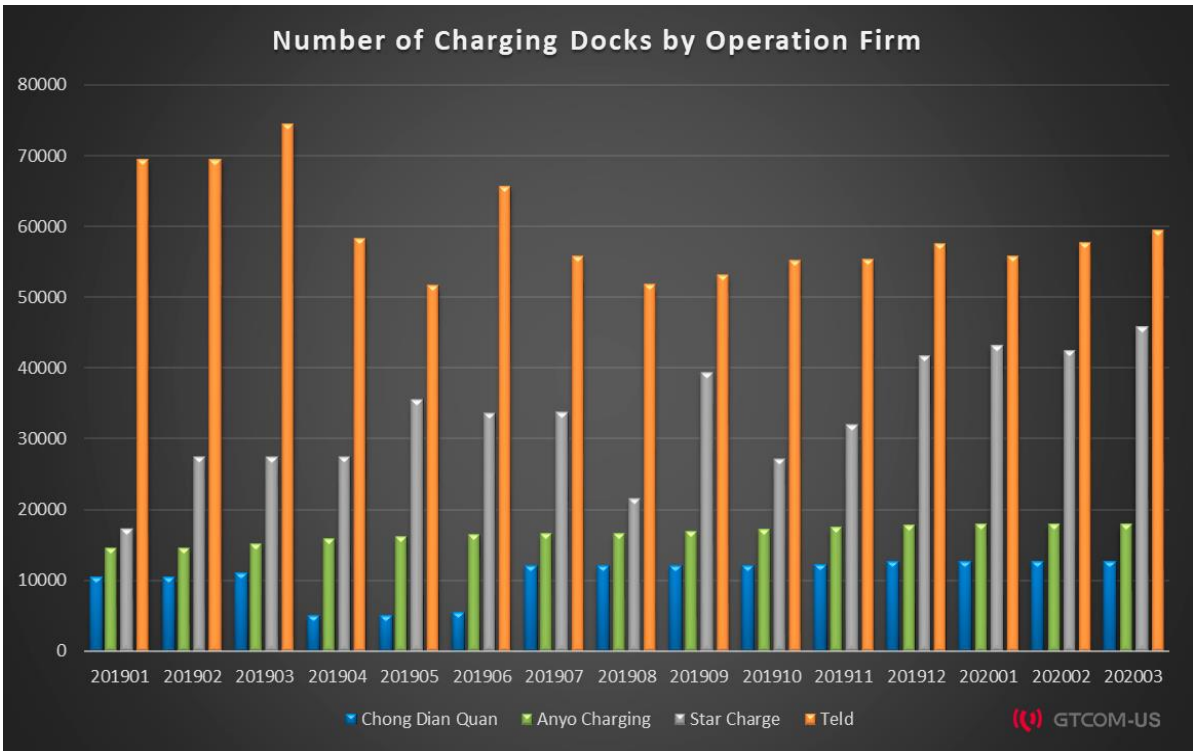



**Charging Dock Growth Index-Nationwide**



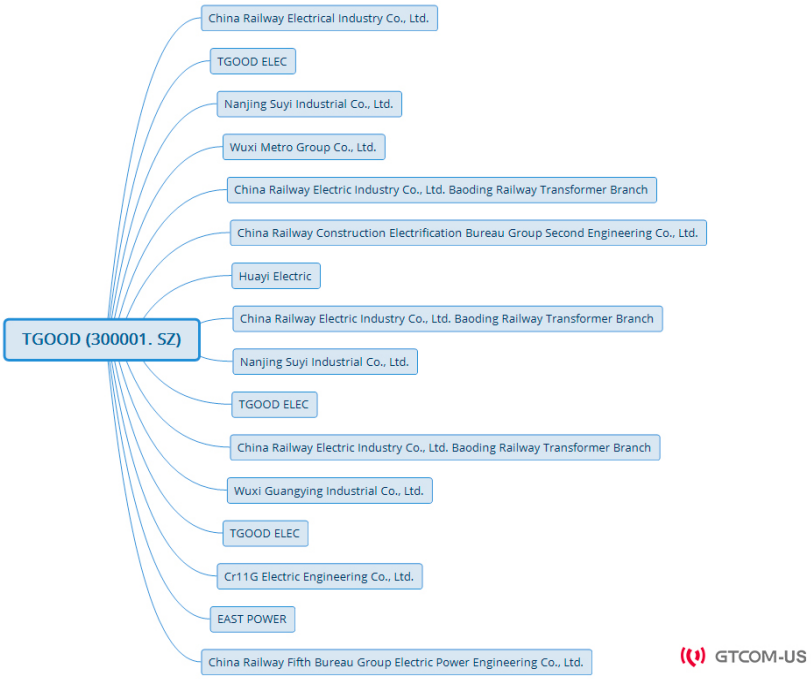

**Charging Dock Growth Index-Provinces Vs. Nationwide**

Furthermore, we can track down the number of public charging docks operated by different firms. Take **Teld**, the largest charging dock operation startup in China, as an example. Teld is the subsidiary of **TGOOD** (300001.SZ), a public listed company in the electricity-related equipment field. According to our data, as of March 2020, the total number of public charging docks operated by Teld is 59,404. The average number of charging docks operated in 2019 was 59722. The highest average price for charging is 1.41 RMB/ Kw.h.



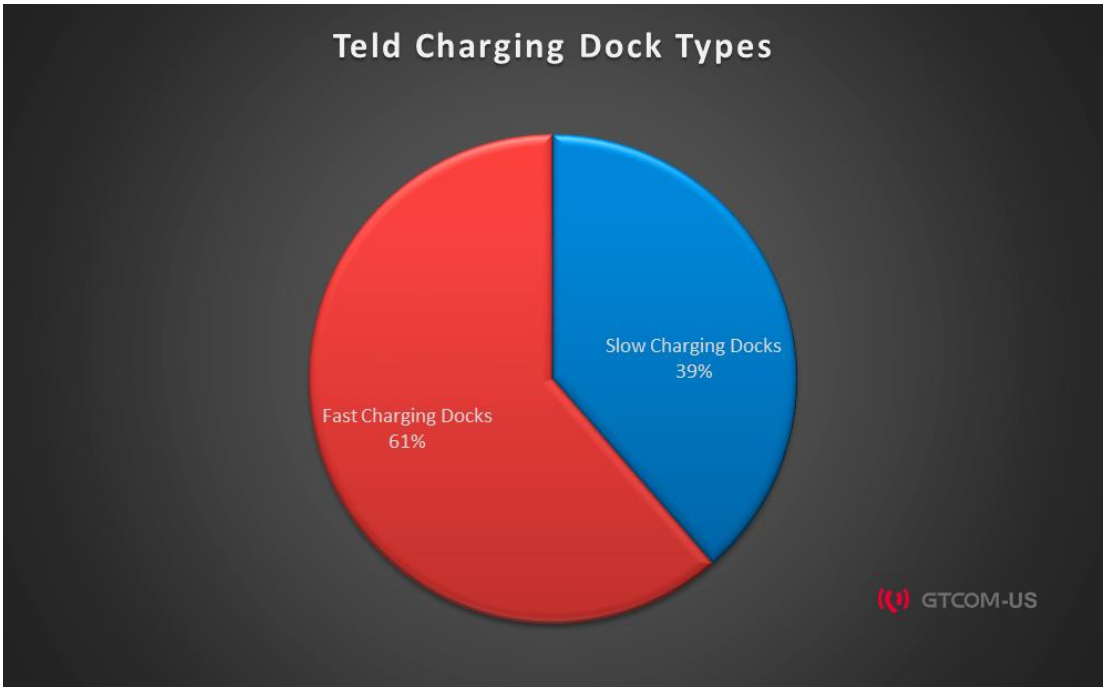

**Number of Charging Docks by Operation Firm**

According to our supply chain analysis platform, **JoveGraph,** which can capture the deal between public-traded firms and their major clients, the total amount of sales contract between the parent company TGOOD and Teld was 77.65 million RMB as of 12/31/2018. Using the number of public charging docks operated by Teld at the beginning of 2019, which was 69,359 divided by the 77.65 million RMB deal, the average cost per charging dock is 1119.5 RMB.



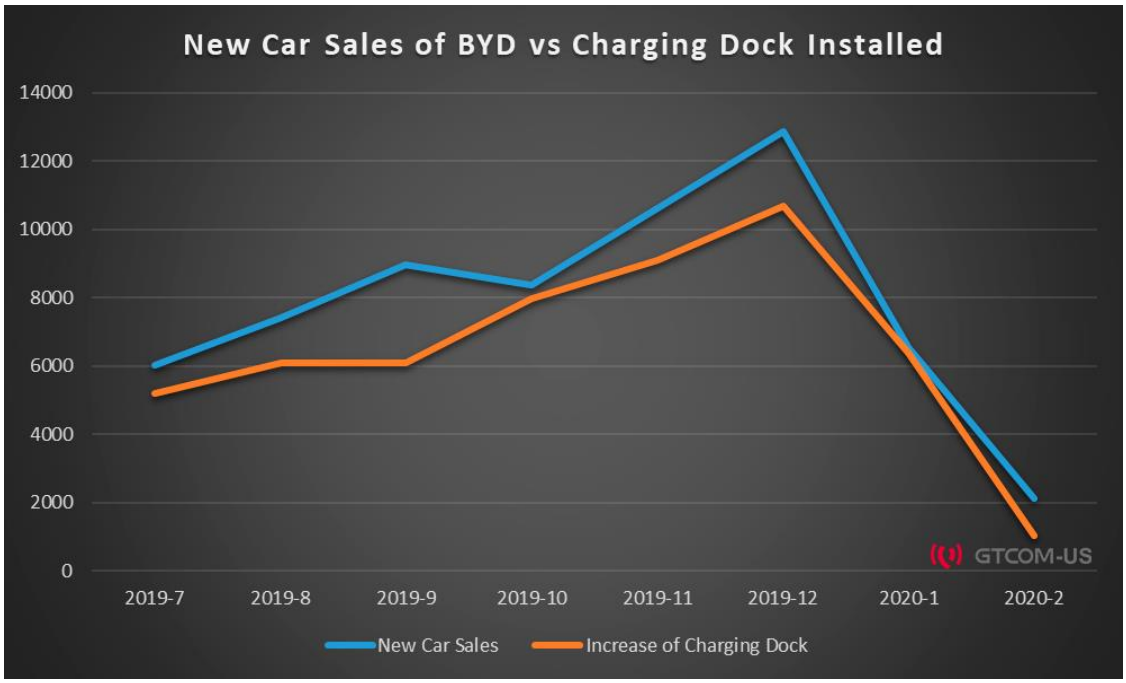

**The supply chain of TGOOD**

Based on the product info from the official website of Teld, the average power for its fast-charging station is 50 KW, and the average power slow charging dock is 7KW. So, the overall average power is 33 KW.  Under the hypothetical condition (16 hours operation/day / charging dock with 80% utilization rate), the revenue per day from public charging docks in the year 2019 was approximately $1.1 million RMB with total revenue of 405 million RMB per year.



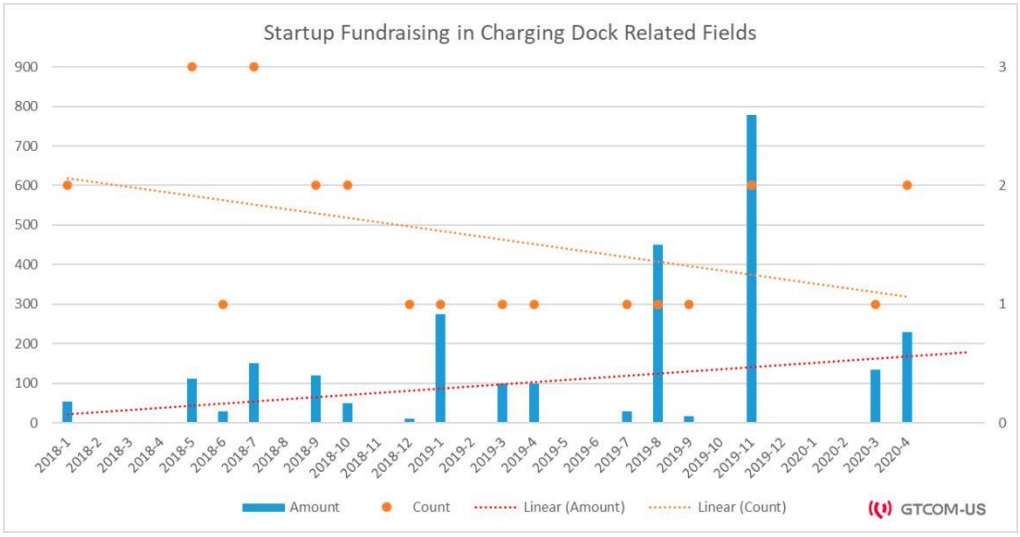

**Teld Charing Dock Types**

Furthermore, combining our monthly EV sales data and the charging dock data by brand, we could cross-check the unit of EV sold and the personal dock installed. Take BYD as an example; the monthly EV sold is slightly higher than the private docks installed, which is reasonable. According to statistics, the private charging dock installation rate on average is 68.5%. That means 32% of the EV owners cannot install their charging dock due to various reasons, including no permanent parking spot, HOA denial, circuit problem. The percentage of private charging dock installation by BYD owners is 79.9%, 11.4% higher than the average level.



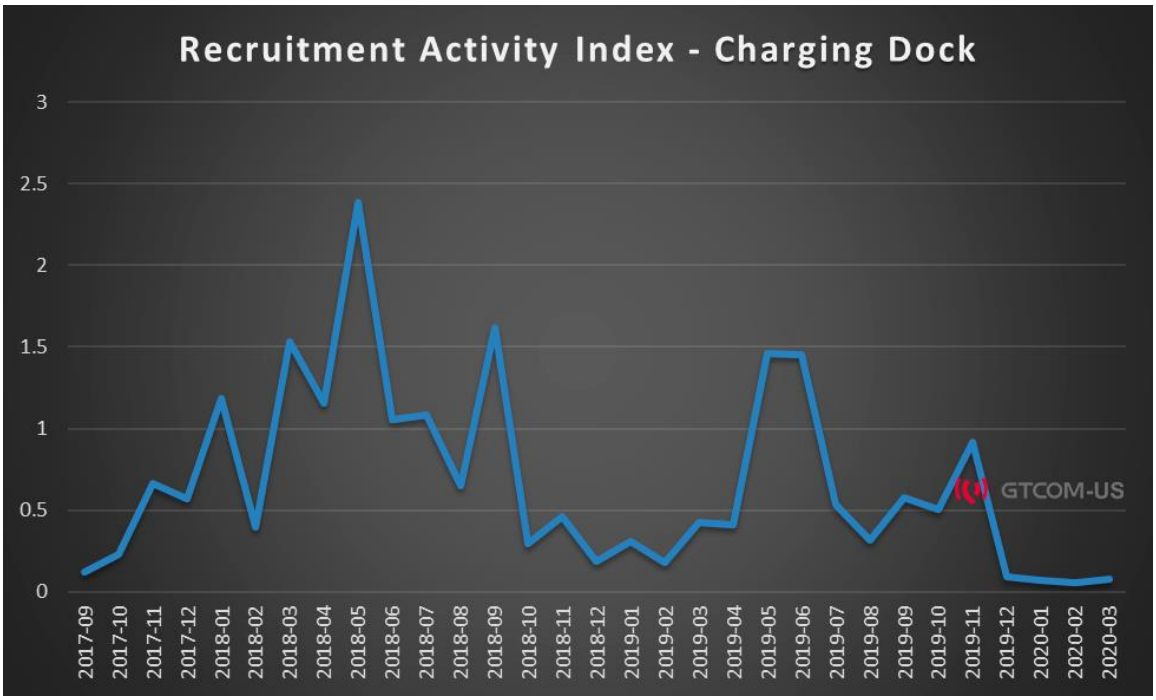

**New Car Sales Vs. Charging Dock Installed**

From the startup frame of reference, we could see that as a capital-intensive field, although the rounds of fundraising have a declining trend from 2018 to 2020, the total amount of money raised has an uptrend, showing that the resources are flowing toward the top companies in the field.




**Startup Fundraising in Charging Dock Related Fields**

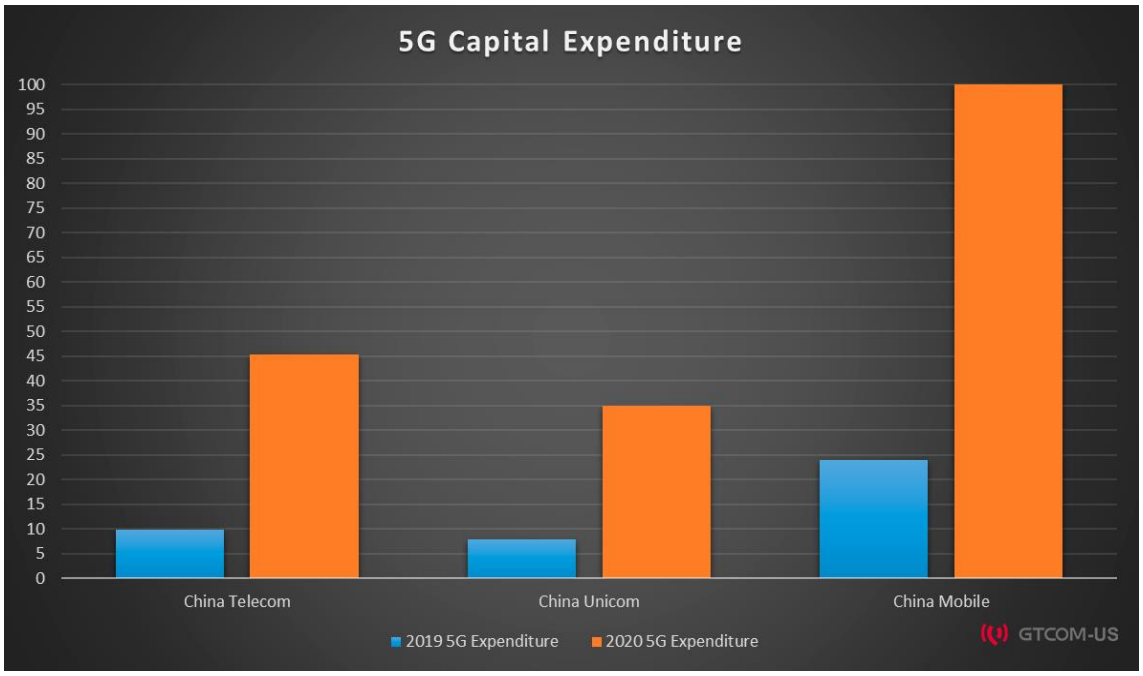
Last, our recruitment index reflects that public listed firms are more active in hiring from April to September in the past two years. In 2020, the hiring activity is lower than the past, possibly due to the pandemic.




**Recruitment Activity Index of Charging Dock**

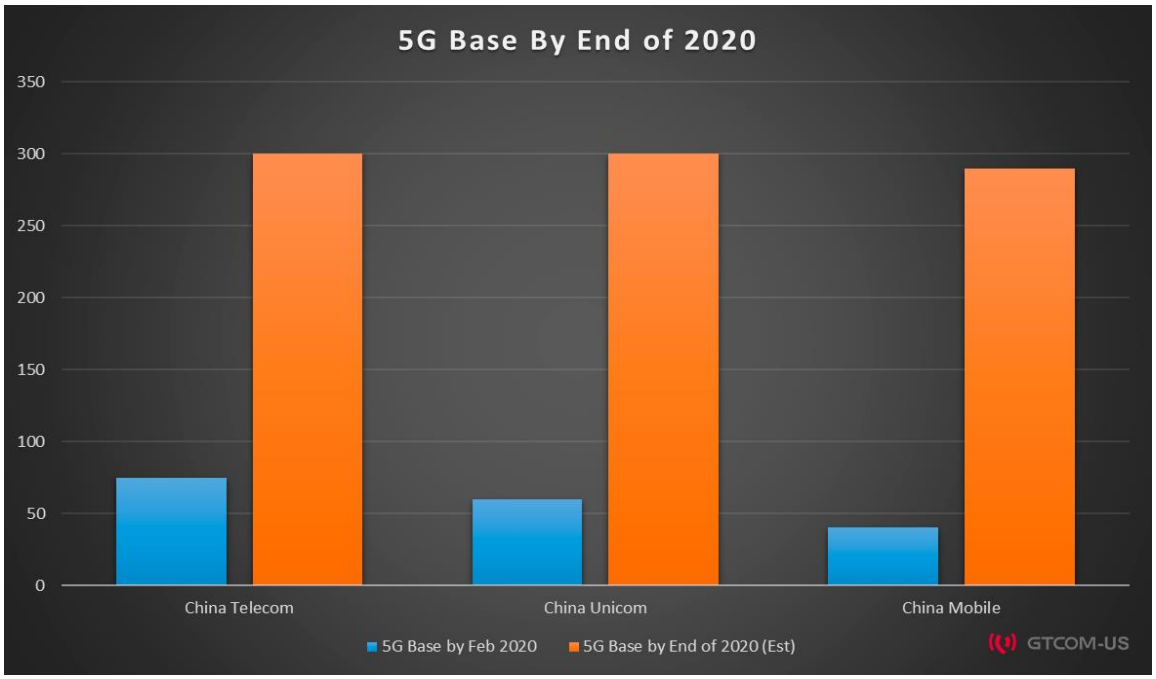
## *2.3 Analysis of 5G*

**5G** communication has become a national strategy since 2019. Furthermore, the three major telecom carriers in China has introduced over 180 billion RMB ($26 billion) investment plan to expand the 5G bases in the year 2020. According to our news data, China Telecom will spend over 45 billion RMB on 5G construction; China Unicom planned 35 billion RMB 5G related expenditure, while China Mobile introduced about 100 billion RMB to expand its 5G capability.



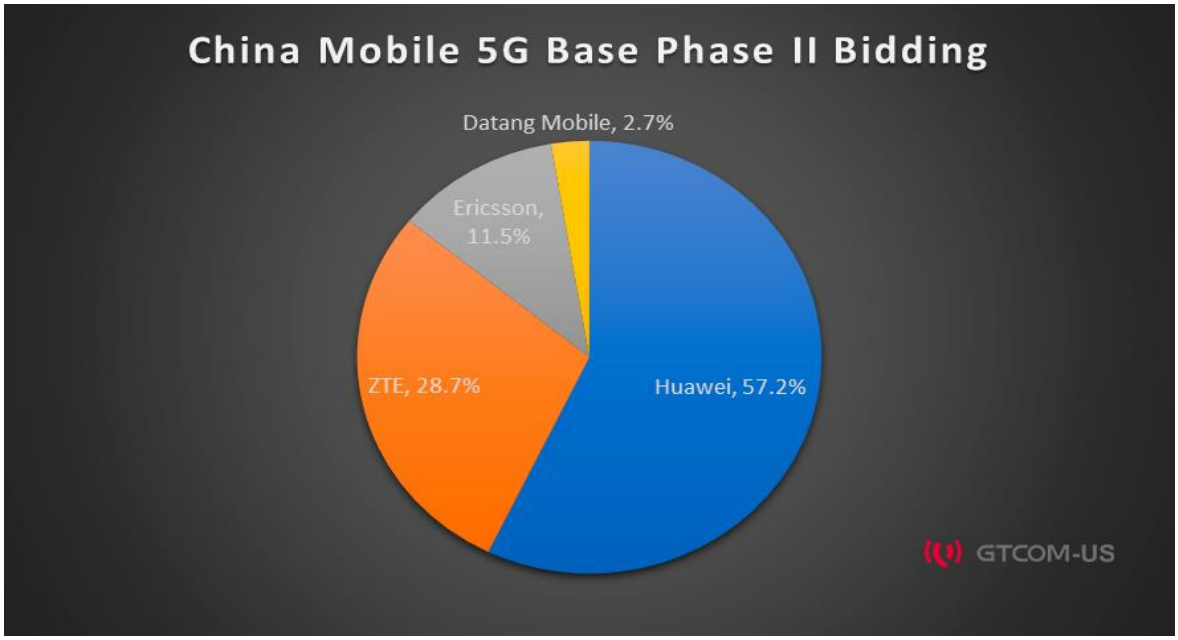

**5G Capital Expenditure Comparison**

With such enormous investment plans, the number of 5G bases will embrace a tremendous growth in the Year 2020. By the end of February, there are approx.175,000 5G stations in use. The numbers will skyrocket to triple to 590,000 by the end of the year. Among them, **China Telecom and Unicom** will co-operate 300,000 of them, and the rest will be constructed and operated by **China Mobile.**



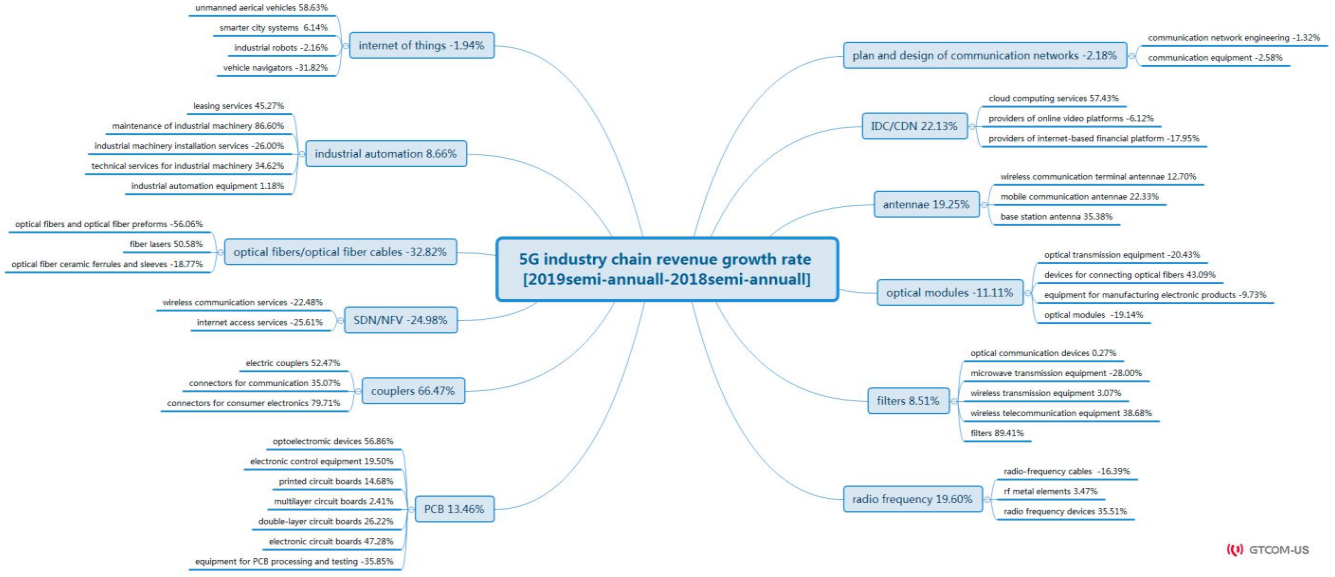

**5G Base Analysis by the end of 2020**

Major 5G equipment providers will benefit from these massive investment projects. From our news data, Huawei, ZTE, Ericsson, and Datang Mobile are the biggest winners. Take the China Mobile 5G Base Phase II as an example. Huawei and ZTE together have won 86% of the 37 billion RMB deal; Ericsson as the only foreign equipment provider took another 11.5%; and Datang mobile got the rest 2.7%.

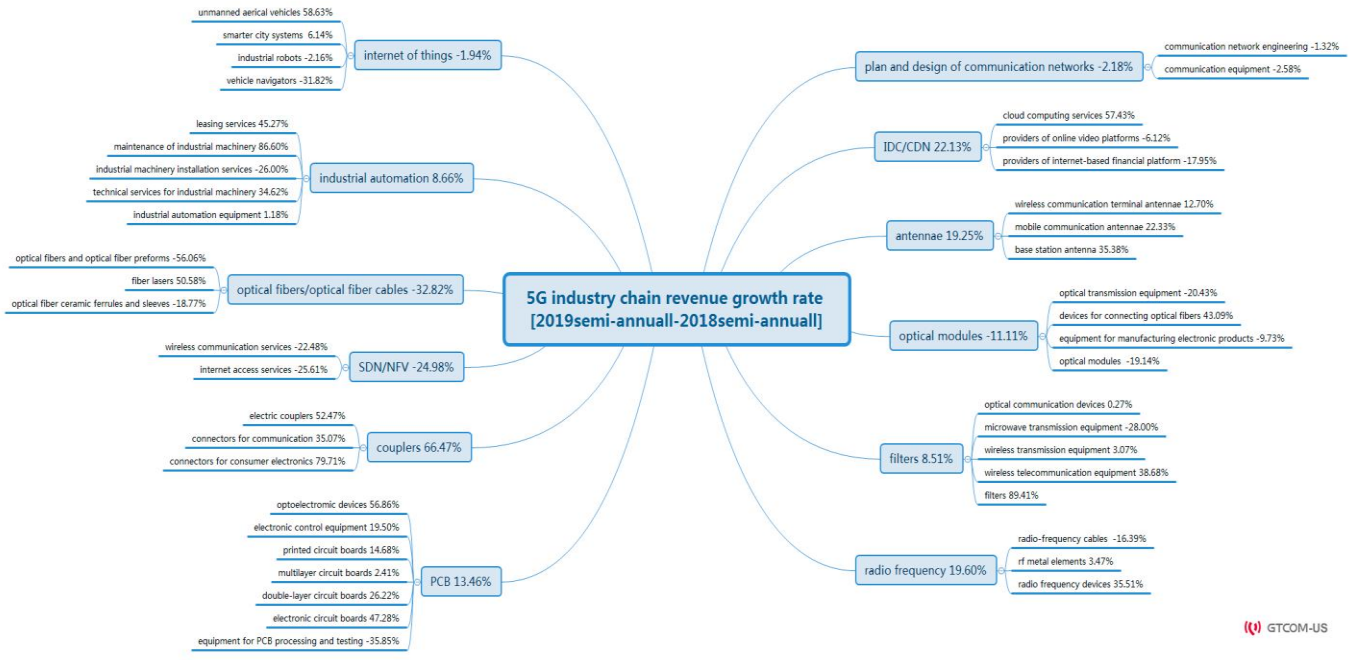



**5G Base Phase II Bidding Analysis**

Furthermore, based on our supply chain analysis, there is a rotation effect between the 5G related industries and sub-sectors. That implies the 5G base providers and their substantial vendors enjoyed the first wave of growth during the early stage of 5G development due to the massive R&D support and infrastructure plan. At the same time, the 5G services become more mature; then, the growth trend will shift toward the consumer product fields, such as mobile phones that support the 5G network.



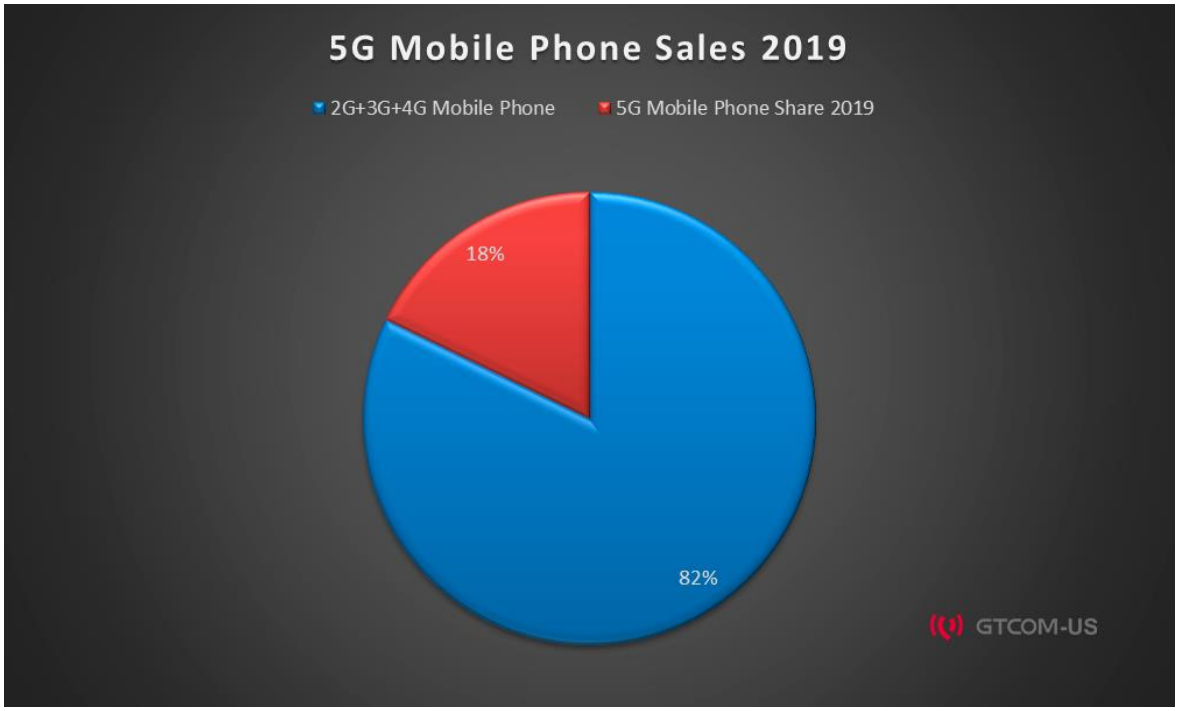

**5G Industry Chain Revenue Growth Analysis**




**5G Industry Chain Profits Growth Analysis**

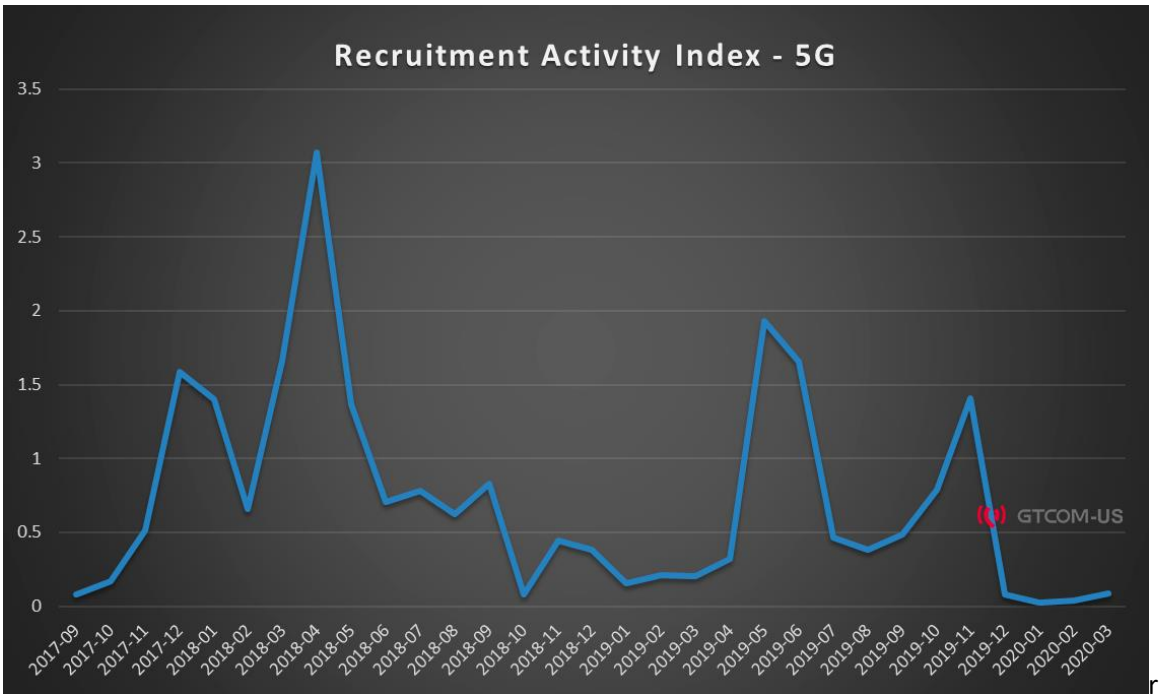
Base on the rotation theory, what more we could do is that we may monitor the month-by-month sales of 5G mobile phone on major e-commerce platforms. According to statistics, the overall sales of mobile phone in China was 359 million units in 2019, and 17.78% or 5.41 million units was 5G mobile phone. Empirically, the sales volume of 5G mobile phone will increase as the 5G becomes

available in more cities in China. Although we did not receive the month-by-month sales at the time drafting the research, GTCOM-US can track the on-line sales granular to brand and model.




**Sales Analysis of 5G Mobile Phone in 2019**

From the recruitment perspective, the 5G sector is also experiencing a low level of recruitment activity in the Q1 2020, possibly due to the COVID-19 impact plus the seasonal effect. However, as the massive investment plan rolled out, we expect that the hiring activities in this field will grow up in the next couple of months.



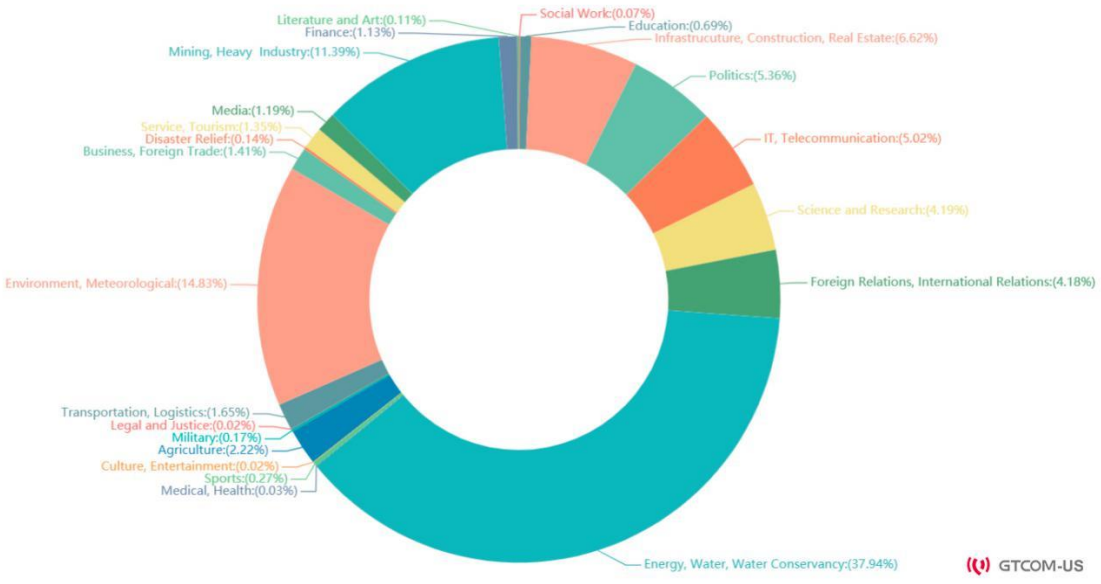

**Recruitment Activity Index-5G**

# *PART II: Thematic Generation and Analysis*

**In Part I**, we introduce how to analyze the main themes of **The New Infrastructure Plan** from the fundamental perspective. But for portfolio managers, they want to dig out what the relevant, valuable industries, domains, technologies, and companies with the hot themes so that they can establish their portfolio, or they can evaluate and optimize their current portfolio. With the comprehensive alternative data solutions provided by GTCOM-US, such as supply chain, science and technology, and news/social media data, we can help our clients to get deeper insights. Here we take **Smart Energy,** which is one of the branches of **The New Infrastructure Plan according to CAICT's New Infrastructure Product Manual** as an example to show how to analyze its relevant sectors, geographic distribution, and companies.

## *Sector Distribution Analysis*

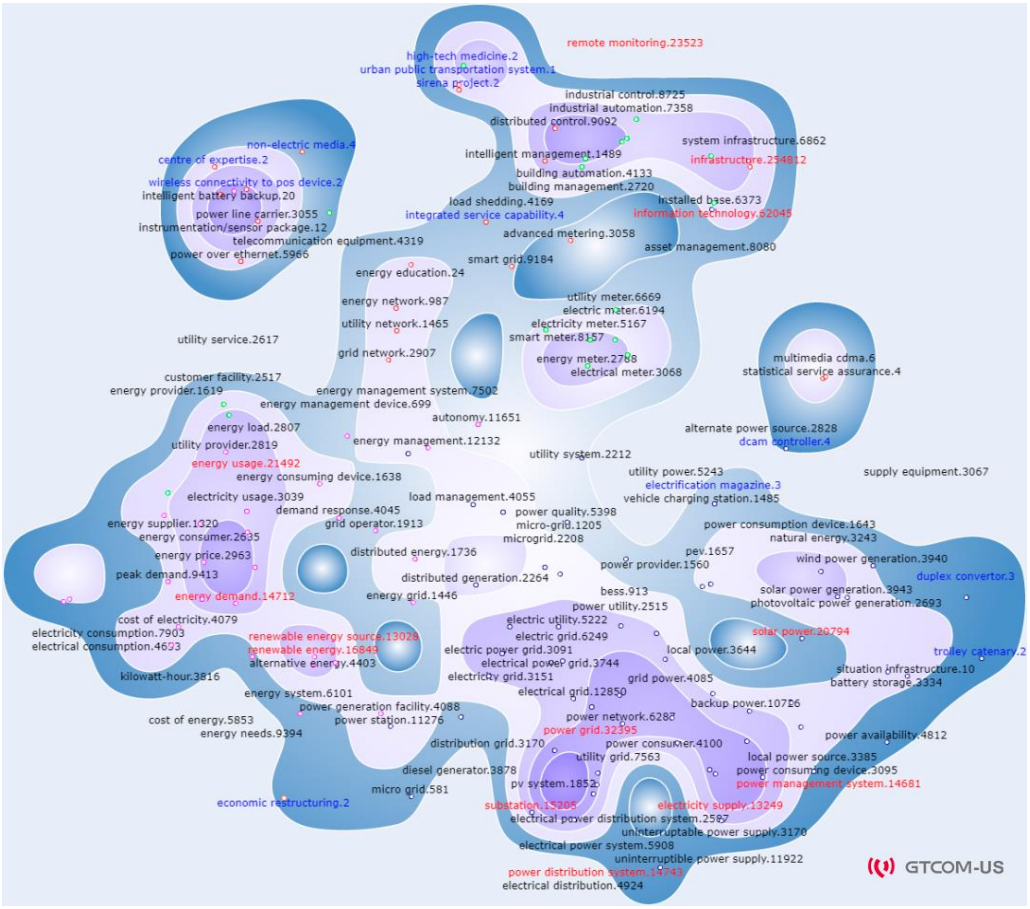
Based on our multilingual NLP algorithms, our Alternative Analytical Engine can quickly dig out the relevant sectors' distribution of **Smart Energy.**




**Sector Distribution of Smart Energy**

## *Technology Distribution Analysis*

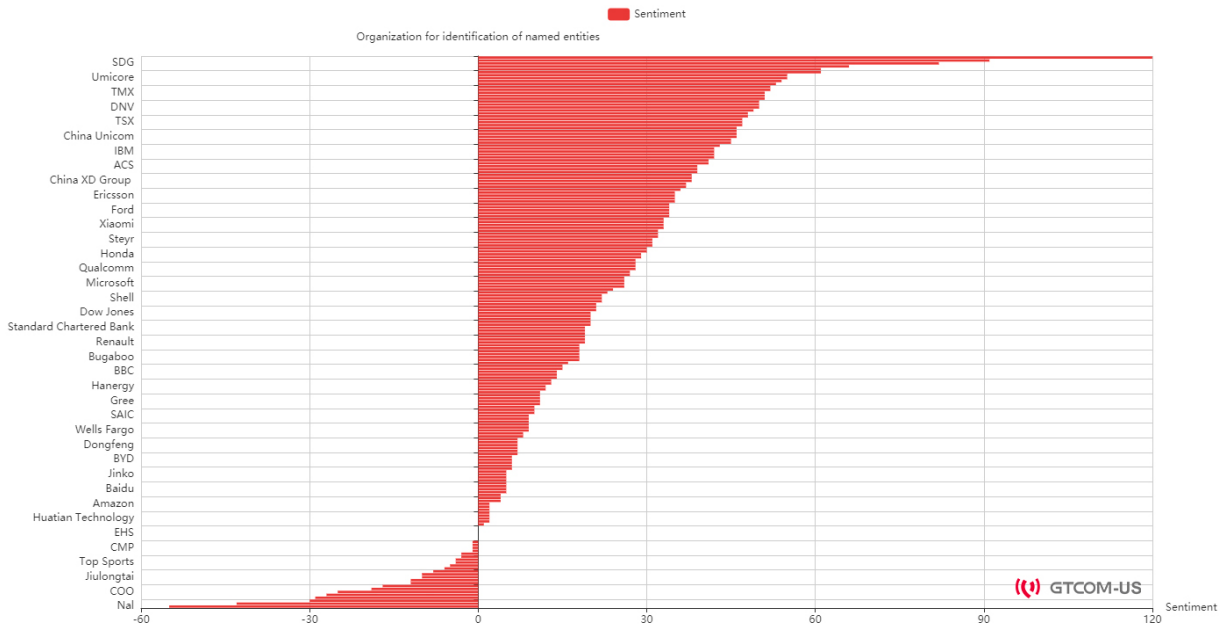
If we want to analyze the relevant or emerging technologies with **Smart Energy,** our analytical platform can generate the map of technology through automatic clustering and word vector methods.




**Technology Distribution Analysis of Smart Energy**

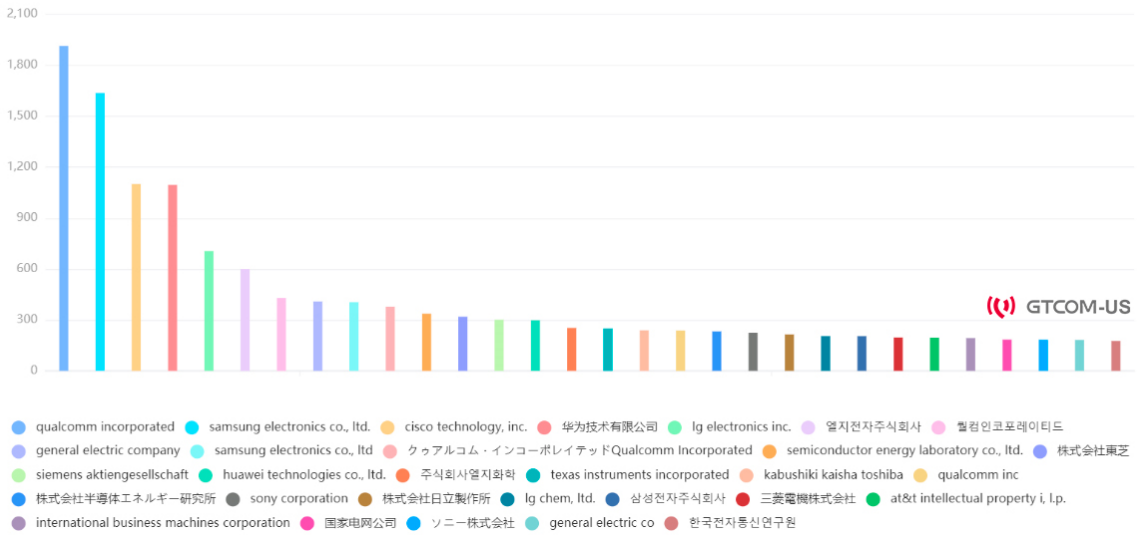
## *Relevant Companies Analysis*

After we know the sector distribution of **Smart Energy**, we may want to know the relevant companies so that we can create a good portfolio. Based on the Alternative Analytical Engine, we can filter out the ranking of those companies with different conditions. For example, the below chart shows the ranking of companies according to the sentiment.




**Ranking of Company in Smart Energy by Sentiment**

Further, based on patent data, we can evaluate companies' technology values so that they help clients analyze their portfolio.




**Ranking of Company in Smart Energy by Core Technologies**

# *PART III: Insights from Quantitative Analysis*

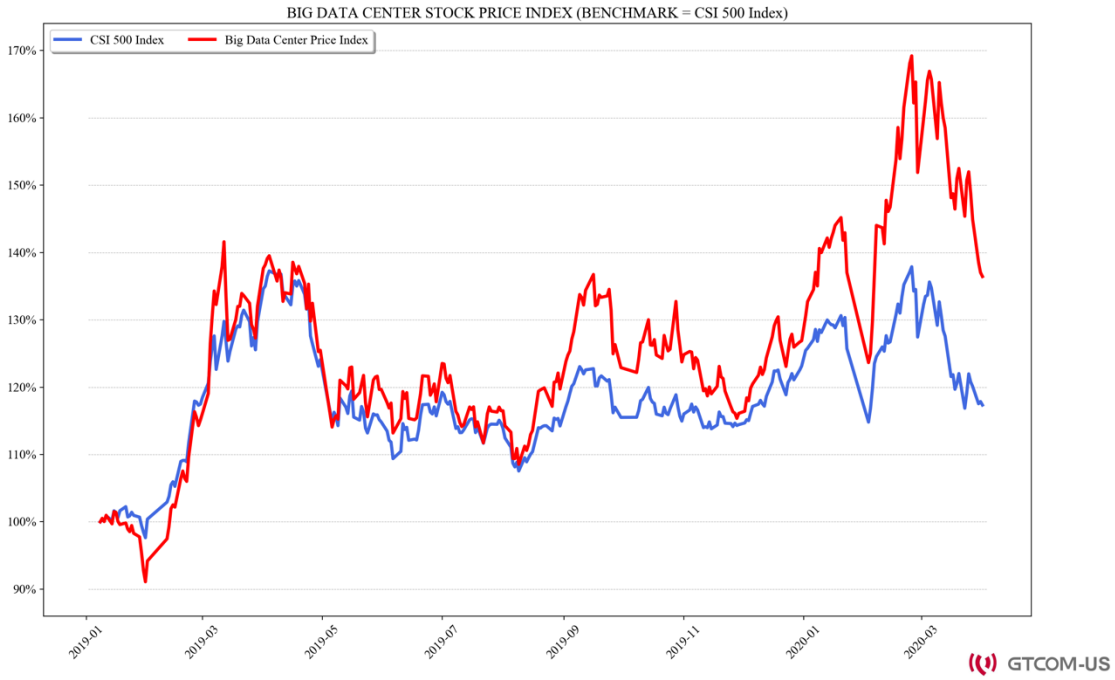
## 1. Overview of Quantitative Strategy

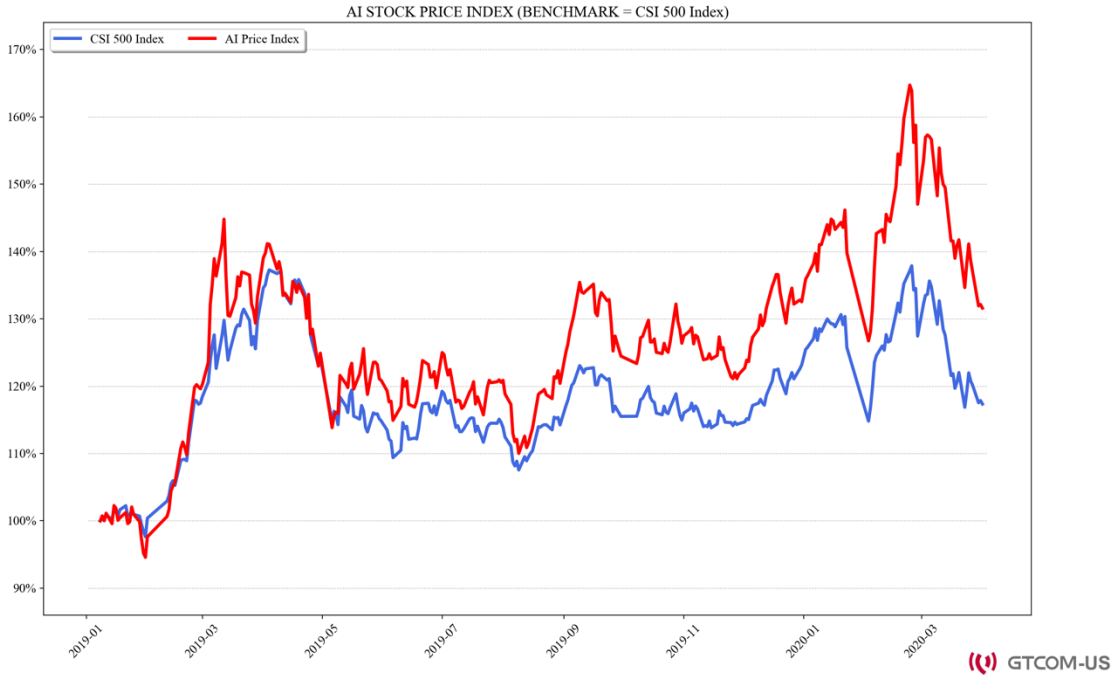
Under normal circumstances, the price level of a hot investment theme is often widely concerned by investors before it emerges. The degree of investors' attention to the investment theme and the degree of investors' emotional tendency will contribute to the highs and lows in the price level of the investment theme. This report studies the relationship between emotional data and investment theme price index and discusses the application effect and potential application path of such data in quantitative research.

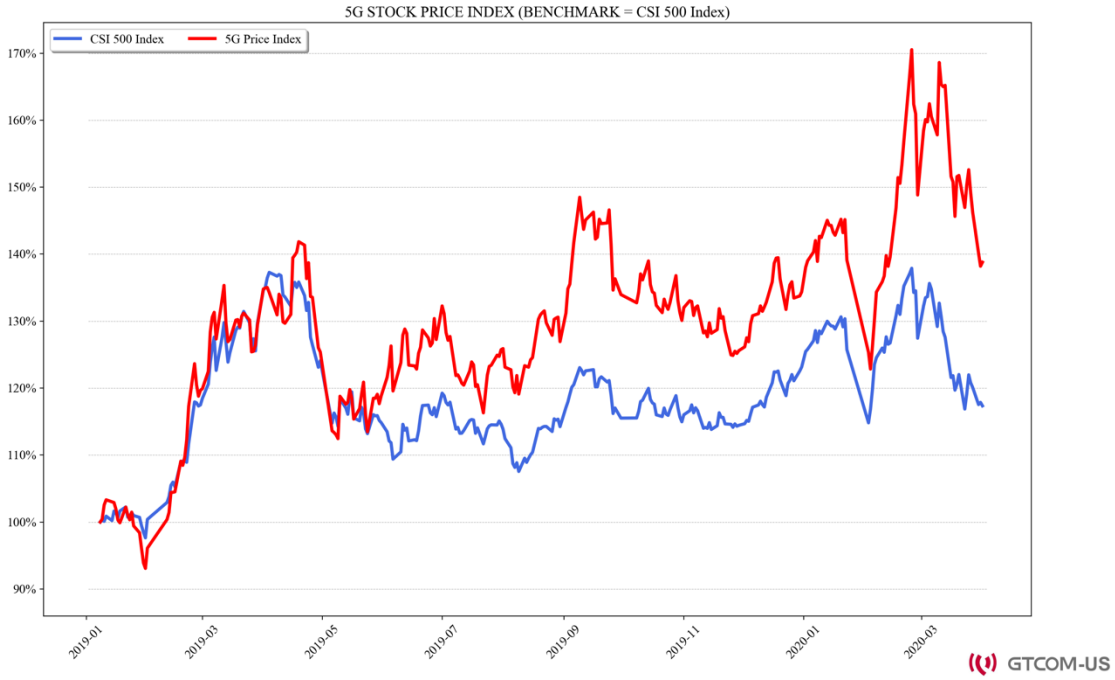
We use GTCOM-US supply chain data to develop an ***Investment Theme Price Index*** and use GTCOM Emotional Data to develop ***Investor Attention Index*** + ***Investor's Emotional Tendency Index***. We combinedly use the ***Investment Theme Price Index*** + ***Investor Attention Index*** + ***Investor's Emotional Tendency Index*** to develop the ***Investment Theme Emotional Timing Strategy,*** trigger trading signals and judge the timing of entering and leaving the market.

### *1.1 Investment Theme Price Index:*

We use GTCOM supply chain data to obtain the upstream and downstream companies in the supply chain of the investment theme, select the stocks of listed companies, and weight the market value of these stock prices to obtain the index.



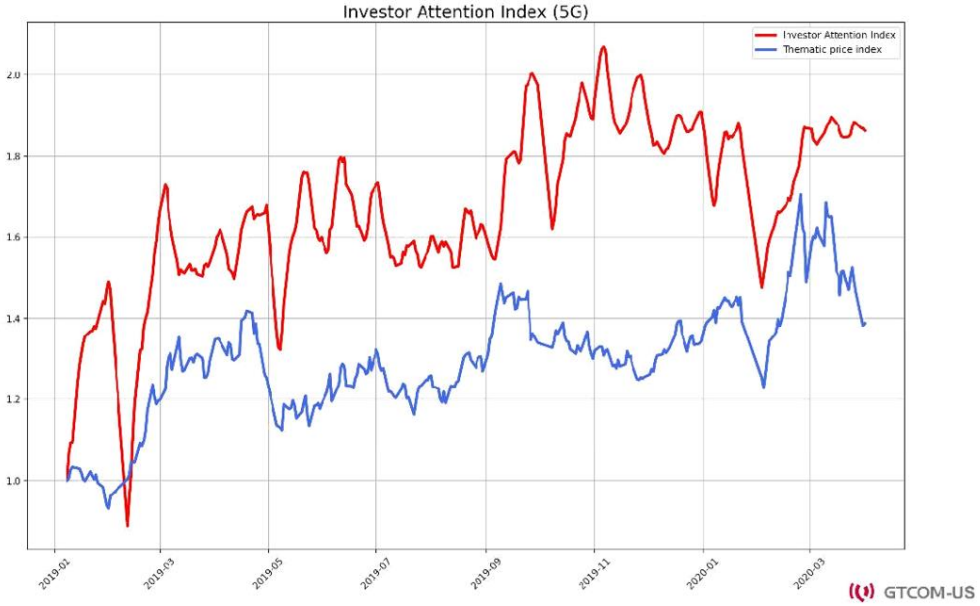


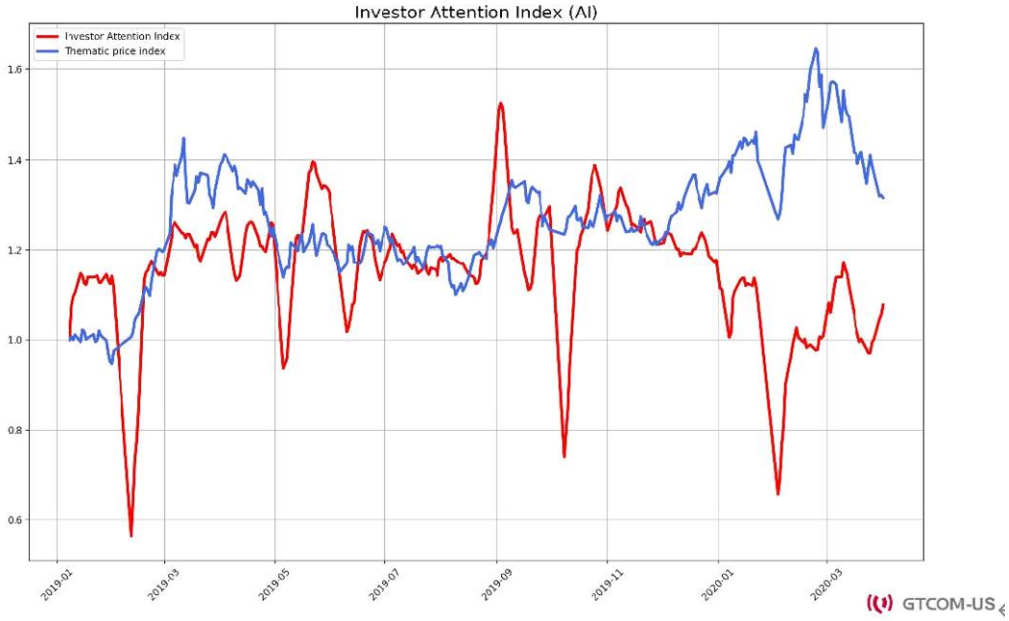



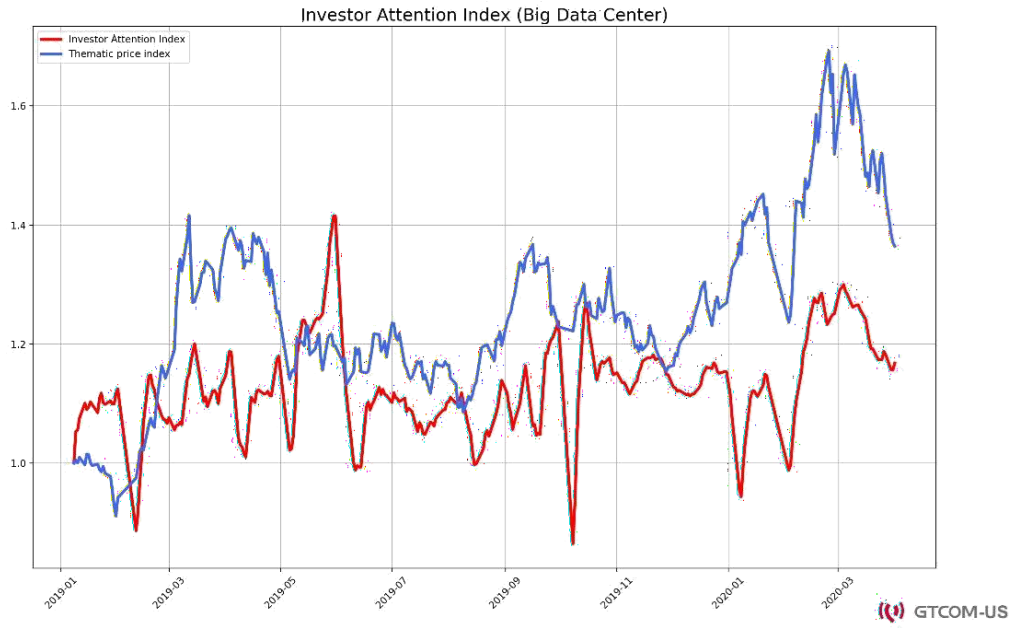

## *1.2 Investor Attention Index:*

We use GTCOM-US emotional data to design the ***Investor Attention Index*** and set the index value on the first day of the retest (backtest) period as the benchmark to calculate the investor attention index. We analyze the correlation between the ***Investor Attention Index*** and the lagging items of the theme plate price index and find that there is a strong positive correlation between the investor attention index and the first-order to third-order lagging items of the theme plate price index, and the average correlation coefficient with the first-order lagging

items is about +0.45. The following three figures depict the relationship between the investor attention index and the price index of the theme plate of 5G, AI, and big data center, the three new infrastructure hot investment themes.

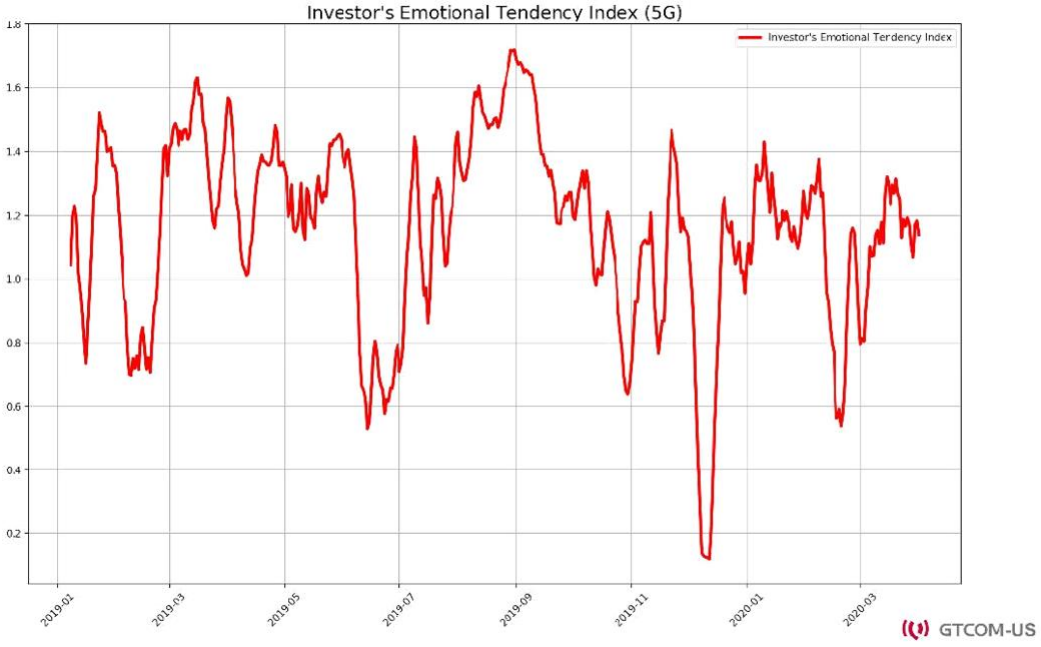


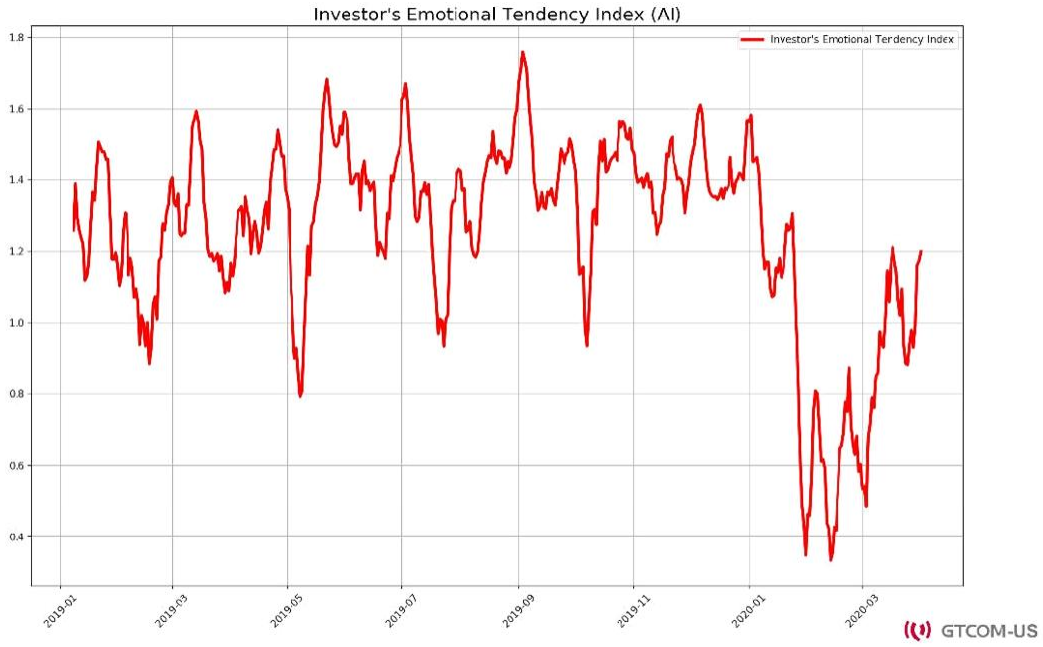



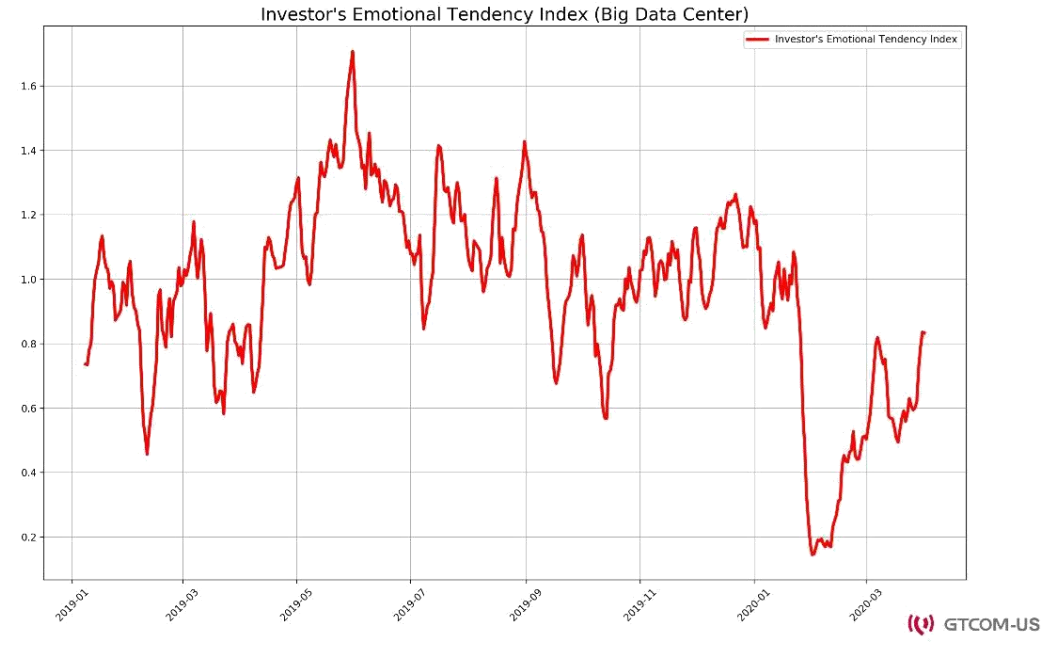



## *1.3 Investor Emotional Tendency Index:*

We use GTCOM-US emotional data to calculate the ***Investor's Emotional Tendency Index*** and set the index value on the first day of the backtest period as the benchmark to calculate the investor's emotional tendency index. We analyze the correlation between the investor's emotional tendency index and the lagging items of the theme plate price index and find that there is a strong negative correlation between the ***Investor's Emotional Tendency Index*** and the first-order to third-order lagging items of the theme plate price index, and the average correlation coefficient with the first-order lagging items is about -0.40. The following three charts depict the trend of investor emotional tendency index of 5G, AI, and big data center, the three new infrastructure hot investment topics, during the backtest period.






We choose the ***China Securities 500 Index*** as the benchmark to measure the performance of the strategy.

**【About China Securities 500 Index】**

The China Securities 500 Index consists of 500 stocks with high total market value after excluding the components of the Shanghai and Shenzhen 300 Index and the top 300 stocks in total market value from all A shares, which comprehensively reflects the stock price performance of a group of small and medium-sized market value companies in China's A-share market.

The index has been included in the IOSCO Financial Benchmark Principles Verification Report as of September 30, 2018.

## Principles of trading strategies

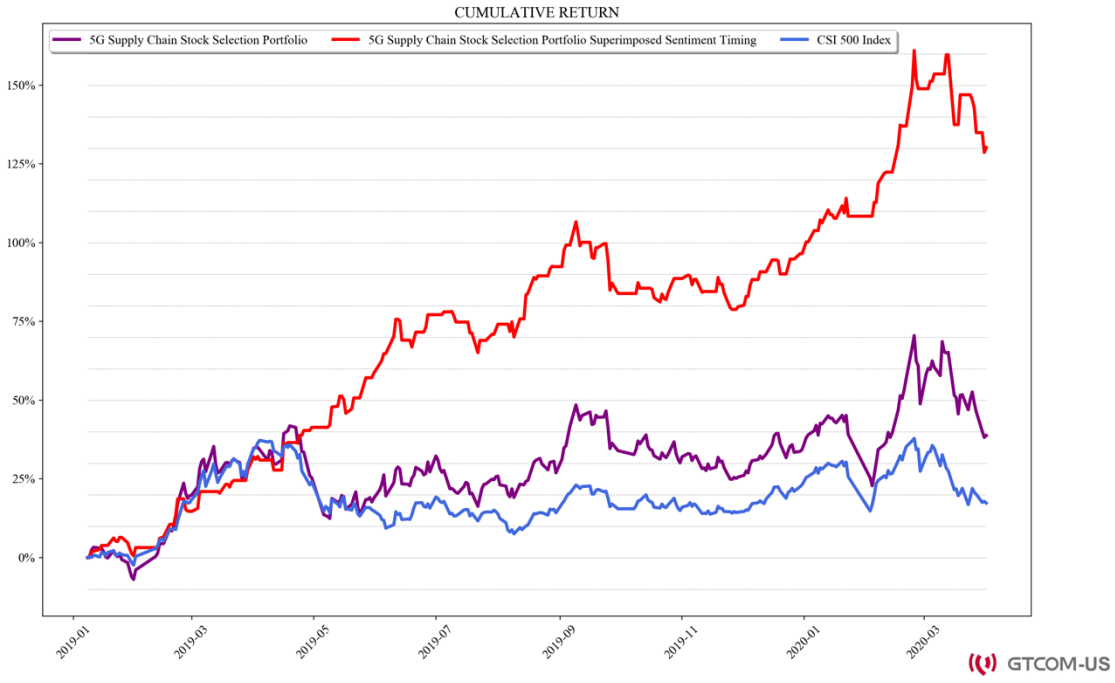
When investors pay more attention to a particular investment theme and if their emotional tendency decreases significantly, also the price index of the investment theme has not yet increased considerably, then there is a higher possibility that the price level will increase soon.

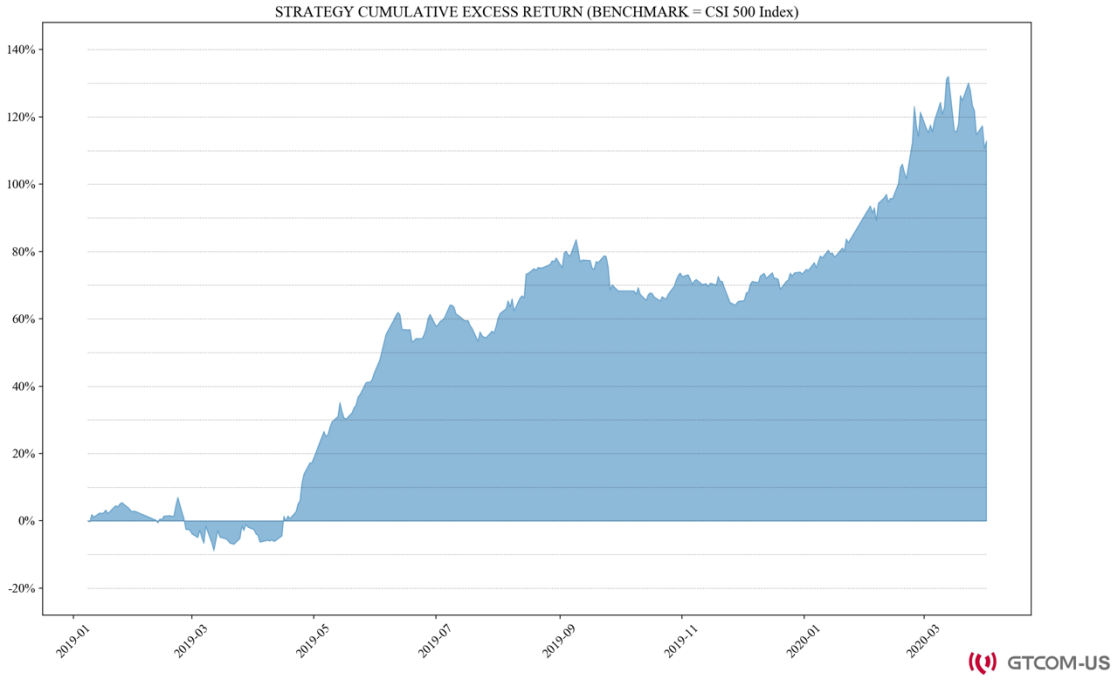
## Backtest Results

We found through backtests that the excess returns of the timing strategy are closely related to the degree of attention paid to the investment theme, that is, the performance of the timing strategy on hot investment themes is significantly better than that on non-hot investment themes.

Such as 5G investment topics, The net value of 5G Theme Price Index at the end of the backtest was 1.388, The final net worth of the Theme Investment Emotion Timing Strategy developed by us through GTCOM-US supply chain data + GTCOM-US emotion data is 2.302, the winning rate of strategy position adjustment is 61.08%, the annualized return rate is 102.42%, the annualized volatility rate is 25.03%, the maximum withdrawal rate is 13.47%, the annualized excess return rate of China Securities 500 Index is 70.58%, Sharp ratio is 2.95, Sortino ratio is 4.92, Calmar ratio is 7.60, the monthly winning rate is 68.75%, and the downside risk is 15.00 %

| | 2019 | | | | | | | | | | | | 2020 | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 1 | 2 | 3 | 4 |
| **Strategy** | .6 % | 14.08 % | 11.42 % | 10.56 % | 12.19 % | 11.69 % | -2.62 % | 11.53 % | -4.43 % | 2.58 % | -4.74 % | 9.36 % | 6.05 % | 19.42 % | -8.13 % | .7 % |
| **ZZ500** | -2.36 % | 20.32 % | 10.39 % | -4.33 % | -7.45 % | .78 % | -.95 % | -.34 % | 1.11 % | -.48 % | -.46 % | 7.61 % | 2.09 % | 1.37 % | -7.52 % | -.44 % |
| **Excess Return** | 2.96 % | -6.25 % | 1.02 % | 14.89 % | 19.64 % | 10.91 % | -1.67 % | 11.87 % | -5.54 % | 3.06 % | -4.28 % | 1.75 % | 3.96 % | 18.05 % | -.61 % | 1.14 % |



**Strategy Outlook:**

Given the excellent performance of emotional timing strategies in hot investment topics, We will subsequently develop a hot investment theme rotation strategy and superimpose emotional timing, bringing hundreds of investment themes in the market into the scope to be selected, which will avoid not only excessive concentration of risks brought by substantial positions on one investment theme, help effectively disperse risks, but also explore potential investment opportunities in all investment themes in the whole market.

Also, we will explore the use of GTCOM emotional data to develop investor emotional factors, which will be incorporated into a multi-factor stock selection model after passing strict tests. We expect that this category of factors has a low correlation with traditional financial fundamental factors and technical factors. At present, the homogenization of such factors is not serious in the market, which can bring significant incremental information benefits to the prediction model.

Finally, we can customize the subsequent development of our models, indicators, and factors according to the actual needs of customers. At the same time, we can monitor the negative public opinions of relevant stocks, industries, and investment topics and continuously update the indicators and factors for customers.

# Acknowledgment

1. **Data Source**
   The sources of the data come from GTCOM-US and our partners' alternative data, including but not limited to China's online and offline transaction data, news and social media data, IP Address data, supply chain data, companies' operation data, investment, and financing data.

2. **Disclaimer**
   Subject to the limitations of research methods and data acquisition resources, this report is only provided to users as market reference materials, and GTCOM-US assumes no legal liability for the accuracy and viewpoints herein. The legal consequences caused by any action taken by any institution or individual based on this report are irrelevant to GTCOM-US, and the related disputes or legal liabilities arising therefrom shall be borne by the performer, and the performer shall bear the related disputes or legal liabilities arising therefrom.

**About GTCOM-US**

**GTCOM Technology Corporation (GTCOM-US)** is a fintech research and data analytics company. With advanced NLP technologies and robust research methodology using Alternative Data, we help clients identify proper data sources, categorize and tag unstructured data, create and evaluate the dataset and deliver the in-depth value in the form of a dataset, dashboard, and analysis reports for the financial and capital markets industry.