

Use of Baidu Index to Measure Public Attention toward Double Reduction Policy in China

Qinyi Tan^{1,#}, Fang He^{1,#}, Luyan Teng^{2,*}

¹Center for Studies of Education and Psychology of Ethnic Minorities in Southwest China, Southwest University, Chongqing, China

²College of International Education, Sichuan International Studies University, Chongqing, China

[#]These two authors contributed equally to this research

*Corresponding Author.

Abstract:

The purpose of this study is to understand the public's attention to the "double reduction" and analyze its trend and distribution, so as to know the public's attention after the release of the double reduction policy. Using Baidu Index as the research tool and "double reduction" as the keyword, the attention and characteristics of Internet users for "double reduction" from July 24, 2021 to October 14, 2021 were obtained from three aspects: trend research, demand map and crowd portrait. It is found that the search trend of the word "double reduction" increased first and then decreased. The public pays the most attention to the "double reduction policy" and "what is the double reduction policy". The groups paying attention to the "double reduction" are mainly distributed in Guangdong, Zhejiang and Jiangsu provinces, and most of them are women aged 30 ~ 39. At the same time, the search trend of the word "double reduction policy" is similar to that of "double reduction". In conclusion, Baidu Index is a research instrument to study the trend of keyword search, gain insight into the change of Internet users' demand and monitor the trend of media public opinion. The influencing factors of the change of the search volume of the word "double reduction" include the implementation of the "double reduction" policy issued by the Ministry of Education, the rectification of educational and training institutions, etc. The public is more inclined to understand the "double reduction policy" and "what is the double reduction policy" related to double reduction.

Keywords: Search engine, Baidu Index, Double reduction; Double reduction policy.

I. INTRODUCTION

Under the driver of Chinese government's objective that effectively ease the overburdened homework and off-campus training for students at the stage of compulsory education (hereinafter referred as "double reduction") to improve schools' educational level and continuously standardize off-campus training (including online and offline training) [1], the "Opinions on Further Reducing the

Burden of Homework and Off-Campus Training for Students at the Compulsory Education Stage” has been issued by the Ministry of Education in China on July 24, 2021, thus making "double reduction" rapidly become the most hot topic in the summer of 2021 [2-10].

Education as the way of continuously cultivating talents for countries has pushed the building of educational power to be the foundation engineering for the great rejuvenation of the Chinese nation [11], just like Liang Qichao's sayings in *“Young China”*, “If we are intelligent, China will be intelligent; if we are wealthy, China will be wealthy; if we are strong, China will be strong; if we are independent, China will be independent; if we are free, China will be free; if we are progressive, China will be progressive; if we are superior to young Europeans, China will be superior to Europe; if we are the best in the world, China will be the best in the world.”[12]. Recently, as an important educational policy attracting wide social attention, “double reduction” requests not only the “school burden reduction” but also the “off-campus burden reduction”, in which, “school burden reduction” mainly implemented inside schools is to further improve the education and teaching quality and the service level of schools through “school burden reduction”, so as to drive students’ learning to better return to campus by making the after-school service basically meet students’ need through the realization of more scientific and reasonable homework arrangement [1]. The main contents of “off-campus burden reduction” are as follows: The first is to adhere to strict institution examination and approval. In all localities, new off-campus discipline training institutions will not be approved any more, the existing ones are uniformly registered as non-profit institutions, the online ones begin to follow to the approval system, and the filed online ones go through the approval procedures again according to the standards. All the discipline training institutions are forbidden to carry on listing to raise capital for capitalized operation, while all the listed companies are forbidden to invest in discipline training institutions by raising capital through stock market and purchase the assets of discipline training institutions through the way of issuing shares or paying cash [1]. Secondly, the off-campus training institutions are not allowed to organize the training of disciplines in national legal holidays, rest days, and winter and summer holidays [13]. With the off-campus training mainly conducted in the online and offline modes, both the offline training institutions represented by “New Oriental” and the various online education and training platforms are all influenced by the promulgation of the provisions on “off-campus burden reduction” [14-16]. With the great impact on primary and secondary schools as well as the employees engaging in training institutions, “double reduction” policy as an important decision deployment of Chinese government standing at the strategic height of achieving the great rejuvenation of the Chinese nation has attracted the attention of central government, the public and the society, which is related to the national future and ethnic development [13].

The increasingly wide application of information technology represented by mobile Internet in various aspects of people’s work, study and life has brought about profound reform to education [17].

The rapid development of the Internet technology in recent years has pushed search engine to be able to meet people's desire for data information as the product of the times under the big data development. Meanwhile, the concern of social science research on the analysis combined with search engine query data has promoted more and more scholars to take search engine query data as new data source for the analysis and research on various behaviors in society [18]. With Baidu as the most popular domestic search engine, different data collection and analysis tools such as Baidu Statistics, Baidu Index, Baidu Shushuo, etc. have emerged as the times require. Search engine query data firstly proposed by Ginsberg [19] et al. For influenza prediction has better effect in user behavior prediction, which later are applied to the prediction of infectious diseases [20], tourism demand [21] and social network attention [22], financial market [23] and other fields. However, the less application of search engine query data to the concern on education in China results in the lack of researches related to double reduction, so this paper attempts to explore the public's attention to "double reduction" under the background of epidemic situation through Baidu Index.

II. MATERIALS AND METHODS

As the data sharing platform based on behavior data of Baidu's massive users, Baidu Index is served as one of the most important statistical analysis platforms of the current Internet and even the whole data times, thus making itself an important basis for the marketing decisions of various enterprises since its release date. Taking "Baidu serves you better in this complicated world" as the core value pursuing, Baidu Company has developed Baidu Index, with the major functional modules as follows: aiming at a word, it includes trend research (including the overall trend, PC trend and mobile trend) demand maps and crowd portrait; aiming at an industry, it includes the overall trend, geographical distribution, crowd attribute, search time characteristics.

In this study, use "double reduction" as search keyword in Baidu Index to summarize the data for online search trend of "double reduction" from July 24, 2021 to October 14, 2021. Then, the searched data is compared with "double reduction policy" as the relevant keyword of "double reduction", so as to evaluate the change of the public's attention to double reduction over time.

III. RESULTS

It is found that the online search trend of the word "double reduction" shows a trend of first increase and then decrease (Fig. 5), with the similar trend shown by Baidu Index whatever in mobile device or PC. In the crowd portrait generated by Baidu Index with the ability of clearly showing the search volume related to double reduction, the provinces and cities in dark blue areas representing the larger search volume indicate the higher attention of Guangdong Province and Zhejiang Province to double reduction

(Fig. 7 & Fig. 8). In addition, the crowd attribute of Baidu Index shows that the people searching the relevant contents of “double reduction” (Fig. 9) mainly are females (55.66%) aged from 30 to 39 (43.6%).

The ranking of popular search words (Tab. 1) shows the most attention of Baidu users to “double reduction policy”. The summary on changes of demand map from July 26, 2021 to October 10, 2021 shows that the public’s attention to “what is double reduction” and “the Ministry of Education” is only second to that to “double reduction policy”. Also, the words “double reduction policy” and “double reduction” have the similar search trend (Fig. 10), but the overall daily mean and moving daily mean of “double reduction policy” are much higher than those of “double reduction” (Fig. 11), which is because that people are prone to input more keywords to ensure the comprehensiveness of the acquired information when using search engine to search information [24].

IV. DISCUSSION

The large population and the great regional difference in China make the public’s attention to double reduction served as a national educational policy difficult to be grasped, which is provided with feasible conditions for the solution by wide application of big data. An investigation report made by International Data Corporation (IDC) shows that the globally generated data with the volume of 1,800 trillion GB in 2011 is estimated to reach 4 trillion GB in 2020 [25]. By June 2021, the Chinese Internet users scaled as 1.011 billion and the Internet penetration rate reaching 71.6% are respectively 21.75 million more than and 1.2 percentage points higher than those in December 2020 [26] (Fig. 1), while the search engine users in China scaled as 795 million is 25.67 million more than that in December 2020, accounting for 78.7% of the total Internet users[26] (Fig. 2), in which, Baidu as search engine ranks first, followed by 360 search, Sogou search, Google search and Microsoft Bing[27], thus indicating that Baidu Index can provide a basis for understanding the public's attention to double reduction.

In recent years, the attention of a growing number of researchers gradually paid to Baidu Index [28-31] has pushed it to be the main source of attention data, thus being applied in the research fields such as disease assessment and prediction, tourism destination attention, stock price index and so on [32-35]. However, with the study of Baidu Index in educational field to be explored, the big data for searching "double reduction" needs to be further studied and extracted. This research as the first attempt to explore the public's online behavior towards double reduction policy under the epidemic situation of COVID-19 has proved the ability of Baidu Index to effectively measure the public's attention to double reduction.

The trend study shows that aiming at the search trend of the term “double reduction” characterized by first increase and then decrease July 24, 2021 to October 14, 2021 (Fig. 5), specifically the search of

“double reduction” shows the upward trend before August 30, 2021, and then shows the overall downward trend but with the not low search index. The upward trend of “double reduction” search has the following reasons: Firstly, “double reduction” policy as a national policy is issued by the Ministry of Education for the overburdened schoolwork of all students in primary and middle schools. According to the data statistics by the National Bureau of Statistics of China on the students in educational schools at all levels in 2020, it is found that the total number of primary and secondary school students in China is up to 156.39 million, accounting for 72.72% of the total number of school students in 2020 [36] (Fig. 3), in which, the number in ordinary primary schools is 107.25 million, and that in ordinary secondary schools ranked second is 49.14 million. Then, the issuance of “double reduction” will inevitably attract the wide attention of teachers and parents working hard behind the numerous students. Secondly, the fourth regulation in “double reduction policy” is to “adhere to strict governance and conduct comprehensive rectification of off-campus training behavior”. A substantial number of training schools originally using capital for rapid expansion have to choose dissolution or layoffs on a large scale; While the training schools with strong strength explore the way of transformation to seek the future development [37]. Thus, the great impact of double reduction policy on the education and training industry is bound to attract public attention. The downward trend of “double reduction” has the following two reasons: Firstly, the implementation of double reduction policy has achieved significant effect since its issuance on July 24 until the end of August. For example, as a large-scale online school with 1,098 teaching centers established in 109 cities of China by February 28, 2021, Xueersi has 155 teaching centers in Beijing by the end of February, but only 53 centers are left right now, with the decrease of 65.8% [38]. An indisputable fact that the glory of education and training industry no longer exists has pushed the public’s acceptance and recognition of double reduction policy to increasingly get higher and higher, thus resulting in the decrease of the public’s attention. Secondly, double reduction policy truly alleviates parents’ anxiety about their children’s education. Before the implementation of double reduction policy, the results of the investigation on “exploring the attitudes towards double reduction policy of parents of students at the stage of national compulsory education” conducted by the Central Propaganda Department of the Communist Youth League and Social Investigation Center of China Youth Daily show that 87.0% of the interviewed parents feel anxious, in which 73.2% of the interviewed parents said that their inability of tutoring their children well is the source of anxiety. After the implementation of double reduction policy, 72.7% of the interviewed parents said their anxiety had been alleviated to some extent, especially middle-income groups have higher proportion [39]. In addition, after the opening of primary and secondary schools on September 1 every year, a series of rich and colorful comprehensive courses will be offered by schools during the after-class educational service officially conducted in new semester [40], which can also alleviate parents’ anxiety. To sum up, both the “cold winter” of training schools and the after-class educational service in new semester of schools all indicate the successful implementation of double reduction policy, thus the decrease in the attention of education and training practitioners and parents to “double reduction” will inevitably bring about the

decrease generally in the attention to “double reduction”.

The further study shows that with the consistency between the search volume of PC and the search trend of mobile device, the search frequency of mobile device is higher than that of PC, which is possibly due to the rapid increase of Internet penetration rate in people's life and the constantly increased number of people using mobile phone to surf the Internet. As the 48th “Statistical Report on Internet Development in China” issued by China Internet Network Information Center, by June 2021, the mobile phone users in China scaled as 1.007 billion is 20.92 million more than that in December 2020, while the proportion of mobile Internet users in all Internet users is 99.6%, which is basically equal to that in December 2020 [26] (Fig. 4).

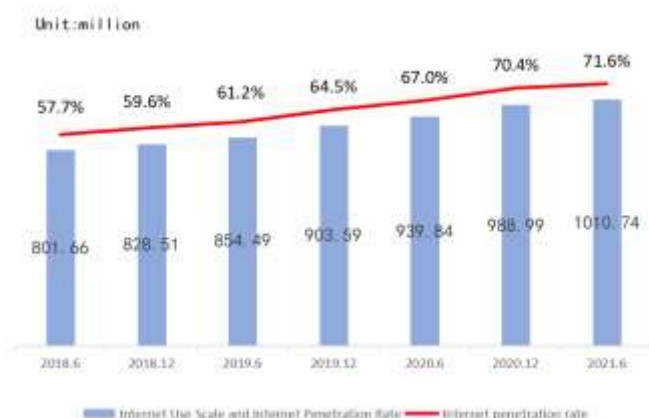


Fig 1: internet use scale and internet penetration rate (CNNIC)



Fig 2: search engine scale and utilization (CNNIC)



Fig 3: number of students in schools of all levels & type in China in 2020

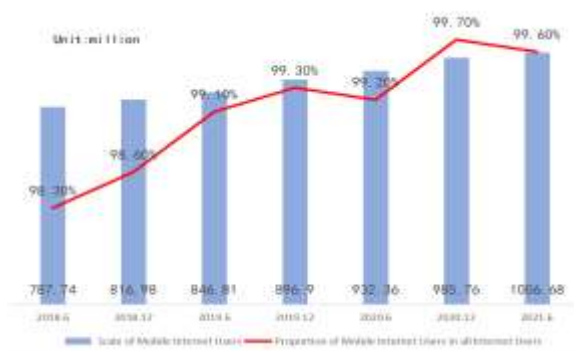


Fig 4: scale of mobile internet users and proportion of mobile internet users in all internet users

A



B



C



Fig 5: baidu search volume index in china for “double reduction”

The average value of search volume (A) The overall search trend index (B) Personal computer search index (C) Mobile wireless search index

With the ability of its data to reflect the public’s attention to “double reduction” and demand distribution, the demand map of Baidu Index takes “week” as statistical unit to summarize the data within one year, thus the proposal of double reduction policy by the Ministry of Education on July 24, 2021 has promoted this research to summarize the top 10 related terms with the highest search popularity every week from July 26, 2021 to October 10, 2021, so as to record the most popular top 10 related terms (Tab. 1) in which, “double reduction policy” and “what is the meaning of double reduction policy” have the highest frequency (Fig. 6), with the following obvious reasons: On the one hand, as a state organ subordinating to the State Council, the Ministry of Education of the People’s Republic of China is a component department of the State Council in charge of education and language work [41], which is also the promulgation department of double reduction policy, thus after the issuance of double reduction policy, people’s retrieval habits make themselves prone to type “double reduction policy” to understand double reduction. On the other hand, people tend to type more keywords during the use of search engines for information retrieval to ensure the comprehensiveness of the acquired information [24], so “what is the meaning of double reduction policy” closely follows.

**TABLE I. Top 10 search terms related to double reduction in the Baidu index**

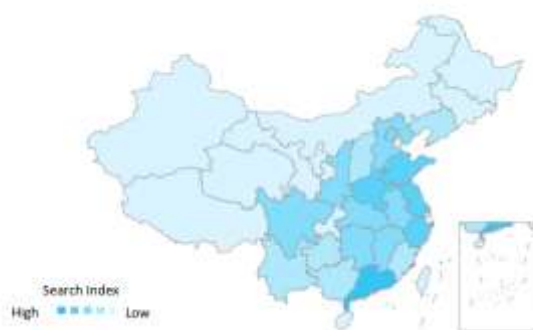
| ORDER | KEYWORDS | FREQUENCY |
|-------|---|-----------|
| 1 | DOUBLE REDUCTION | 11 |
| 2 | WHAT IS THE MEANING OF DOUBLE REDUCTION | 9 |
| 3 | MINISTRY OF EDUCATION | 9 |
| 4 | WHAT IS DOUBLE REDUCTION | 8 |
| 5 | WHAT ARE THE FIVE ITEMS OF MANAGEMENT | 6 |
| 6 | ITEMS OF MANAGEMENT | 6 |
| 7 | NEW ORIENTAL | 5 |
| 8 | TRAINING INSTITUTIONS | 4 |
| 9 | ADVANTAGES AND DISADVANTAGES OF DOUBLE REDUCTION POLICY | 4 |
| 10 | THE LATEST RELEASE OF DOUBLE REDUCTION POLICY | 3 |

356

are respectively as 16.062 million, 9.2013 million and 6.0923 million (Fig. 8) [42]. The existence of a family behind every child decides the requirement of home-school cooperation for the implementation of double reduction policy [43]. The numerous parents' attention to the double reduction policy inevitably caused by the first ranking of the number of basic education students in Guangdong Province has made the retrieval quantity of Guangdong Province rank first.

In the ranking of cities, Beijing stably ranks first, followed by Shanghai, which is because that in article 7 of “Opinions on Further Reducing the Burden of Homework and Off-Campus Training for Students at the Compulsory Education Stage” for doing a solid job in pilot exploration to ensure the steady progress of governance and it clearly stipulates cities of Beijing, Shanghai, Shenyang, Guangzhou, Chengdu, Zhengzhou, Changzhi, Weihai and Nantong to be the nine pilot cities in China [44]. As the first batch of pilot cities, Beijing and Shanghai with the adoption of a series of measures [45-46] to promote the implementation of the double reduction policy will be bound to rank first and second in the rankings of cities.

A



B



Fig 7: Baidu index maps for “double reduction” by province (A) and city (B)

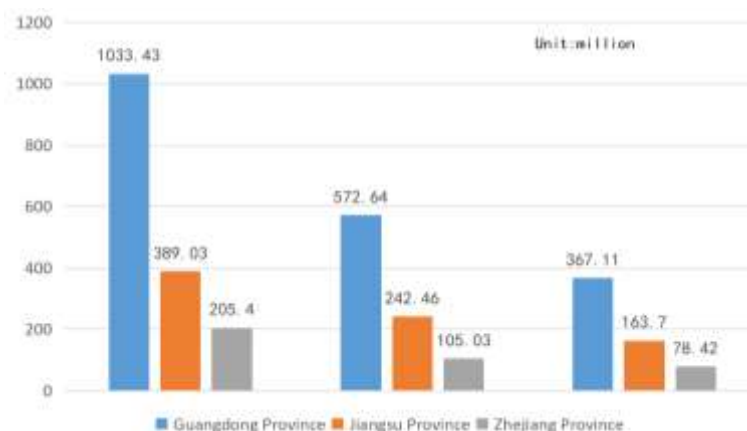
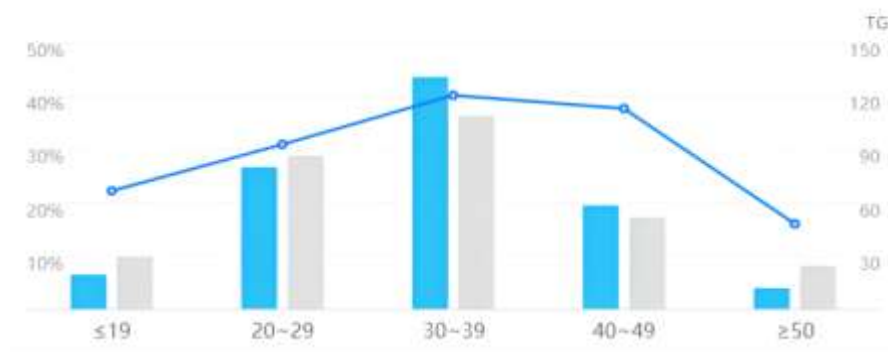


Fig 8 number of basic education students in Guangdong province, Jiangsu province and Zhejiang province in 2019

The analysis on crowd attribute by using the social attention data from September 15, 2021 to October 14, 2021 shows that the respective proportions of male and female are 44.34% and 55.66% (Fig. 9), indicating the higher attention of females. In age distribution, the group aged from 30 to 39 with the highest social attention degree (43.6%) represents the attention of parents of primary and secondary school students to double reduction policy. Then, the group aged from 20 to 29 with higher social attention degree (26.66%) represents the attention of the groups making a living on training schools to double reduction policy; the group aged 19 and below has lower attention degree (6.44%); the attention degree of the group aged from 40 to 49 is 19.42%; the group aged 50 and above with the lowest proportion is only 3.87%. In addition, the ability of reflecting the strength or weakness of the target group within a specific research scope (such as geographical region, demographic field, media audience, product consumers) makes target group index (TGI) used to show the differences in attention of users with different characteristics, in which, TGI being equal to 100 represents the average level, which indicates that the attention of such users to a certain kind of issue is higher than the overall level when being greater than 100. In gender distribution, the TGI of female and male is respectively as 111.51 and 88.53, thus indicating the more interests of female group in related information of double reduction. Under the influence of China's long-term traditional concept of "men are superior to women", a division of roles has gradually formed in the "family oriented" Chinese family, that is, the man goes out to work while the woman looks after the house [47]. Therefore, females focus on internal issues, namely child care and family. In modern society, the existence of gender division of labor between husband and wife in the family will be continued in the future [48]. The above reasons make female's TGI higher than male's.

A



B

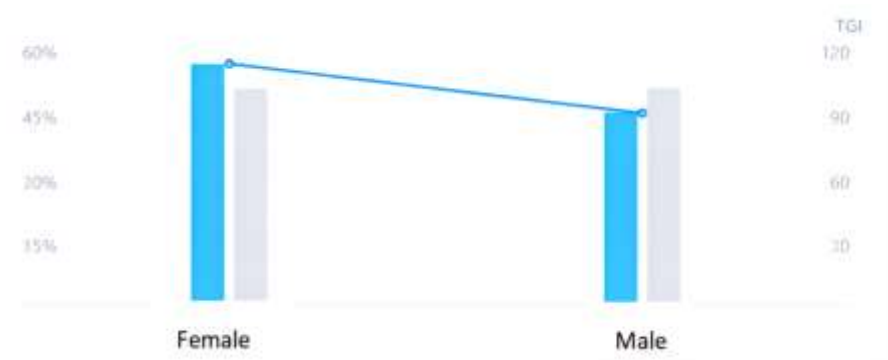


Fig 9: demographic profiles by age (A) and gender (B)

It is found that the terms of “double reduction policy” and “double reduction” owns the similar search trend (Fig. 10), but the overview on search index shows that the overall average daily value and mobile average daily value of “double reduction policy” are both higher than those of “double reduction” (Fig. 11), which has the following reasons: Firstly, as a state organ subordinating to the State Council, the Ministry of Education of the People’s Republic of China is a component department of the State Council in charge of education and language work [41], which is also the promulgation department of “double reduction”, thus after the issuance of “double reduction”, people's retrieval habits make themselves prone to type “double reduction policy” to understand double reduction. Secondly, people tend to type more keywords during the use of search engine for information retrieval to ensure the comprehensiveness of the acquired information [24], thus resulting in the higher overall average daily value and mobile average daily value of "double reduction policy" relative to "double reduction".

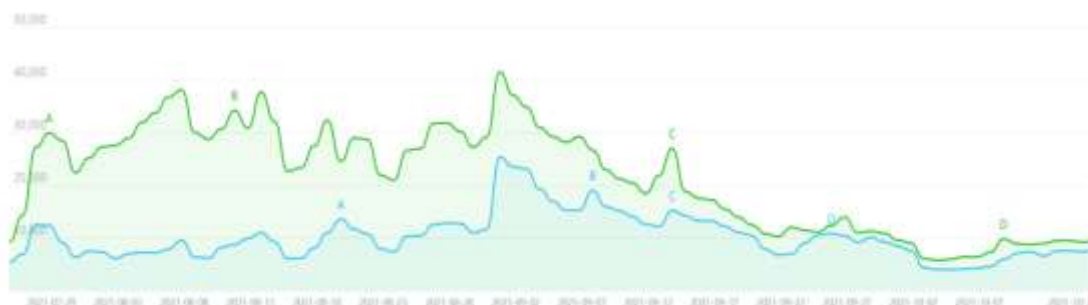


Fig 10: Baidu search volume index for “double reduction” (blue line) vs “double reduction policy” (green line)

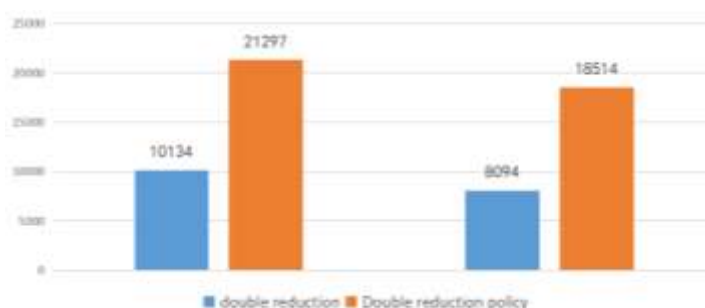


Fig 11: overview of search index

Although Baidu Index can obtain data quickly and easily, Baidu index still has some limitations. First, the data of the popular version of the Baidu Index is relatively macro, and the search trend is only based on the search behavior of users in the Baidu search box. If you need to deeply understand the reasons behind the behavior and the factors of data change, you need more comprehensive data sources and more detailed data statistical analysis. Second, Baidu Index is based on the Baidu search engine, and its data source is limited to China. This study did not evaluate data obtained by other search engines, such as google trends. Third, although Baidu Index can analyze trend research, demand maps, and crowd portrait, it cannot obtain demographic data for the time being. Moreover, Baidu Index may also have a deviation in sampling. Lack of use skills and educational level are the main reasons why non-internet users do not surf the Internet [49]. Existing studies show that 54.5% of the people do not surf the Internet because they do not understand computers/networks, 20.0% do not surf the Internet because they do not understand Pinyin and other educational level restrictions, 14.0% do not surf the Internet because they do not have computers and other Internet equipment, and 13.8% do not surf the Internet because they are too old or too young. The proportion of people who are not interested in surfing the Internet is less than 10% [50]. Fourth, Baidu Index collects data only from the keywords and does not analyze the search motivation of the crowd for this word. Based on the “double reduction” data collected by Baidu Index, it can be seen that part of the data comes from groups that really want to know about double reduction, such as students, parents,

education and training institutions and their employees, and the other part of the data may come from groups such as staff and teachers of education administrative departments working around the double reduction policy, who contribute to the search of “double reduction” in their daily work. In this sense, it is difficult to accurately grasp the population with real needs for double reduction. To sum up, although the function of Baidu index still needs to be continuously improved and improved, we can understand the search popularity and overview of keywords, and then analyze the user behavior, the user needs, and crowd portraits of a series of searches such as products, industries, and events represented by keywords.

V. CONCLUSION

The use of Baidu Index can understand the public's attention to "double reduction". The results show that the decline of the "double reduction" search trend is closely related to the implementation of the double reduction policy. In terms of gender, women are more inclined to understand "double reduction". Guangdong Province, with a large population, ranks first among the provinces in China in terms of attention to double reduction, while Beijing, as one of the first batch of pilot cities, ranks first in terms of city ranking. Although the search trend of "double reduction policy" is consistent with that of "double reduction", its daily average value of search is higher than that of "double reduction".

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