

# A Study on the Supply Conditions of College and University Graduates in Liaoning Province

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**Abstract:** This study investigates the supply conditions of college and university graduates in terms of total quantity and incremental quantity, analyzes the influencing factors of college and university enrollments, including regional population and GDP level, and finally, probes into the specialty construction situation of colleges and universities in Liaoning Province, in order to further investigate the construction situation in each discipline, and thereby making an in-depth analysis of its development.

**Keywords:** Liaoning Province; College and university graduates; Supply conditions

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## 1. An increase in the overall number of university enrollments and graduations in Liaoning Province

As of February 2021, there are 45 postgraduate training institutions in Liaoning Province, including eight research institutions and 37 ordinary universities; there are 44 ordinary colleges and universities, 63 undergraduate universities, and 51 higher vocational colleges; in addition, there are 18 independent colleges for adult education.

In 2020, 56,000 students were enrolled in graduate programs, with a 5.2% increment (3,000 students) from the previous year. Among them, 4,000 were doctoral students, while 52,000 were master's students. In addition, 306,000 students enrolled in ordinary undergraduate universities, vocational undergraduate universities, and higher vocational colleges, with a 15.5% decrement (56,000 students) from the previous year. Among those students, 191,000 enrolled in ordinary undergraduate universities, 788 in vocational undergraduate colleges, and 115,000 in higher vocational colleges. A total of 124,000 students enrolled in undergraduate or vocational colleges for adult education, with a 12.7% increment (14,000 students) from the previous year. Among those students, 74,000 enrolled in undergraduate colleges, while 50,000 enrolled in vocational colleges.

In 2019, the enrollment expansion was implemented in vocational colleges because their enrolment saw a decreasing trend before 2019; however, the enrollment rate of other types of education showed a stable year-by-year increase <sup>[1]</sup>.

## 2. A moderate increase in the number of college and university graduates in Liaoning Province within the past five years

The number of college and university graduates has fluctuated between 360,000 and 380,000 annually within the last five years. Of those graduates, undergraduate enrollment was the largest in scale, followed

by the enrollment of junior college students, college students, and undergraduates from colleges for adult education, masters, and doctoral studies.

The total number of undergraduates and graduates nearly doubled that of junior college students, indicating that undergraduate and professional education may reflect the universality and professionalism of education. The Ministry of Education implemented the enrollment expansion for postgraduates and enlarged the scale of students upgrading from junior colleges to universities in 2020, resulting in an increasing number of postgraduates by 189,000 and the number of students upgraded from junior colleges to universities by 322,000. Affected by national policies, the undergraduate and graduate enrollment and graduation rates will continue to increase.

### **3. Analyzing the influencing factors of college and university enrollments in Liaoning Province**

#### **3.1. A positive correlation between regional population size and enrollment rate**

Data on both the regional population size and the college and university enrollment rates in Liaoning Province within the last ten years were obtained from Liaoning Statistical Yearbook and the information provided by Liaoning Provincial Department of Education. SPSS was then used to analyze the correlation between the college and university enrollment rates and the regional population size. The results revealed a significant positive correlation between these two variables, in which the correlation coefficient was 0.818 within the 95% confidence interval. The larger the regional population size, the higher the rates of college and university enrollments.

The reasons for which individuals decide to pursue higher education include the desire to gain knowledge, enhance their skills, cultivate accomplishment, achieve self-development, and land an ideal job in the labor market<sup>[2]</sup>. Over the past few decades, it has been proven that the higher the level of education that advanced economies could provide, the lower the unemployment rate. To be more precise, graduates with higher level of education in these countries could earn on average twice as much as those with mandatory retirement, and in major industrial societies, the rate of return from investment in education is higher than that in business. In China, a consensus has been reached on the aforementioned aspects, and that is why Chinese families emphasize a lot on their children's education<sup>[3]</sup>.

#### **3.2. A significant correlation between the number of students and regional population**

In 2020, there were 178,348 colleges in total. University graduates from Liaoning Province chose to receive education in their own province, accounting for 61.23% of the total number of graduates in that year, while 112,916 graduates from other provinces chose to receive education in Liaoning Province, accounting for 38.77% of the total number of graduates.

Among the graduates who were actually raised in Liaoning and chose to receive higher education in their own province, 15,243 were graduate students, 87,942 were undergraduates, and 75,163 were graduates from technical colleges. Shenyang had the most students, with 28,800 students in total, accounting for 9.89% of the total number of students in Liaoning Province. Dalian and Chaoyang followed with 22,897 and 19,044 students, respectively, accounting for 7.86% and 6.54% of the total number of students in that province, while the remaining regions all had figures below 5%. Considering the population of each region in Liaoning Province, it can be appreciated that there is a significant positive correlation between the number of students and the population size of each region<sup>[4]</sup>.

#### **3.3. A positive correlation between GDP level and enrollment rate**

By using SPSS 21.0 to determine the correlation between the GDP and the enrollment rates of colleges and universities in Liaoning Province, it was found that there is a significant positive correlation between Liaoning Province's GDP and its enrollment and graduation rates. The higher the GDP level, the higher the

enrollment and graduation rates. In other words, GDP and enrollment rates have an increasingly similar distribution.

#### **4. Specialty construction of various disciplines in Liaoning Province**

By analyzing the number of students in various disciplines and the specialty construction of various disciplines in Liaoning Province, the overall supply situation of college and university graduates in Liaoning Province has been grasped, so as to provide a reference for the construction of specialties in colleges and universities in Liaoning Province. By consulting online platforms and the statistical yearbook, relevant data were found, and results were obtained through data analysis.

##### **4.1. Postgraduate disciplines**

The discipline with the highest enrollment and graduation rates in Liaoning Province is engineering, followed by medicine, management, science, law, economics, education, literature, art, agronomy, philosophy, and history. This situation is not very different from that of graduate students in various disciplines in China.

##### **4.2. Distribution of disciplines and specialties in Liaoning Province**

###### **4.2.1. Undergraduate disciplines and specialties in Liaoning Province**

In 2020, the discipline with the highest number of graduated undergraduates was engineering, followed by management, art, medicine, literature, economics, science, normal education, education, law, agronomy, history, and philosophy. This situation did not differ much from that of undergraduate students in various disciplines in China.

The top 10 specialties of engineering offered by colleges and universities include computer science and technology, automation, communication engineering, electronic information engineering, mechanical design and manufacturing and its automation, environmental engineering, electrical engineering and its automation, software engineering, civil engineering, and Internet of Things engineering.

The top 10 specialties of management offered by colleges and universities include accounting, marketing, business management, information management and information system, logistics management, tourism management, engineering management, human resource management, financial management, and e-commerce.

More than ten colleges and universities have set up the following specialties for undergraduate art students: visual communication design, environmental design, animation, product design, music performance, musicology, radio and TV editing, and performance.

The top specialties of medicine for undergraduates include nursing, clinical medicine, medical imaging technology, stomatology, medical iconography, pharmacy, preventive medicine, anesthesiology, rehabilitation therapeutics, medical laboratory technology, traditional Chinese medicine, pharmaceutical preparations, clinical pharmacy, psychiatry, basic medicine, clinical medicine of traditional Chinese medicine and western medicine, traditional Chinese medicine pharmacy, ophthalmic medicine, cultivation and identification of traditional Chinese medicine, and pharmaceutical management.

More than ten colleges or universities have set up the following specialties for undergraduate literature students: English, Japanese, Chinese language and literature, Chinese international education, journalism, and advertisement science.

More than five colleges and universities have set up the following specialties for undergraduate economics students: international economics and trade, finance and banking, economics, financial engineering, economic statistics, insurance, and finance science.

More than five colleges and universities have set up the following specialties for undergraduate science students: applied chemistry, information and computing science, mathematics and applied mathematics, biotechnology, applied physics, chemistry, applied psychology, data science and big data technology, biological science, and physics.

More than five colleges and universities have set up the following specialties for undergraduate education science students: social sports guidance and management, physical education, primary education, and preschool education.

More than five colleges and universities have set up the following specialties for undergraduate law students: law, social work, and ideological and political education.

More than three colleges and universities have set up the following specialties for undergraduate students in agronomy: animal medicine, animal science, landscape architecture, and horticulture.

The following specialties have been set up for undergraduate students in history: history and archaeology.

Philosophy has been established for undergraduates in philosophy.

In terms of the number of students, the specialties chosen by the students receiving undergraduate education in colleges for adults can be ranked from top to bottom in the following order: medicine, engineering, management, education, literature, and law.

In terms of the number of students, the specialties chosen by the students receiving online undergraduate education can be ranked from top to bottom in the following order: management, engineering, medicine, economics, and law.

#### **4.2.2. Specialty construction of various disciplines in vocational colleges**

In terms of the number of students, the top in Liaoning Province is finance and business, followed by equipment manufacturing, education, electronic information, transportation, civil architecture, medicine and health, tourism, culture and art, agriculture, forestry, animal husbandry and fishery, biology, resources, food, public management, energy, public security, water conservancy, and media dissemination. In China, in terms of the number of students, the categories chosen by students receiving vocational education in colleges can be ranked from top to bottom in the following order: finance and commerce, medicine and health, equipment manufacturing, education and sports, civil architecture, electronic information, public management and services, transportation, culture and art, tourism, public security, and judicial.

#### **4.2.3. Disciplines with the highest number of specialties**

In comparison to other disciplines, philosophy and history are offered in only a few colleges and universities. Whether in Liaoning Province or throughout China, the enrollment and graduation rates for these disciplines are lower as well.

The top 10 undergraduate specialties in Liaoning Province include computer science and technology, accounting, English, marketing, automation, international economy and trade, electronic information engineering, communication engineering, Japanese, mechanical design, as well as manufacturing and automation.

#### **4.2.4. Specialties approved by the Ministry of Education within the last two years**

The number of newly approved specialties in each region has a significant positive correlation with the regional GDP and the number of universities.

In 2020, a total of 2,046 undergraduate specialties were approved in China, of which the top five in number include artificial intelligence (130), intelligent manufacturing engineering (84), data science and big data technology (62), management and application of big data (59), and robot engineering (53). A total

of 96 specialties were approved in Liaoning Province, of which the top five in number include data science and big data technology (6), intelligent manufacturing engineering (4), new media art (3), intelligent manufacturing (3), and artificial intelligence (3). The Ministry of Education has been encouraging colleges and universities to practice professional optimization, adjustment, upgrading, replacement, and construction by adding new records for reference in addition to the approval and revocation of specialties; furthermore, the ministry has also been strengthening the construction of the connotated specialties. The prominent features lie in three aspects: supporting specialties that are in great demand, supporting new specialties, and preventing specialties from being overheated <sup>[5]</sup>.

## 5. Conclusion

In the past two years, the optimization and upgrading of specialties in colleges and universities have been directly oriented to several industries, including the service information industry, aerospace industry, new energy industry, new materials industry, and biological engineering industry. This pattern reflects the evolution of the industrial structure from a labor-intensive type to capital-intensive and technology-intensive types. In the process of evolution, the demand for labor skills has been increasingly pursued. The continuous development of real estate, financial insurance, education, and cultural industries in tandem with urbanization and industrialization necessitates a labor force with high-level education and skills. Furthermore, due to the development of various industries concerning service information, aerospace, new energy, new materials, and biological engineering, along with other technology-intensive industries, a relatively higher degree of specialization, automation, and intelligence is required for production and services, in addition to advanced techniques and intelligence for labor. Therefore, it is not only necessary for higher education to adapt to the development of the industrial structure, but also reasonably advanced in this process.

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## Disclosure statement

The authors declare no conflict of interest.

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