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Research on Dual Cultivation Model of Postgraduate Degree in Applied Statistics in the Context of Digital Economy

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Abstract

With the advent of digital economy, statistics is gradually integrated with the rapidly developing emerging technologies such as big data, Internet of Things and artificial intelligence. The demand for high-level, complex and practical applied statistics talents from government, enterprises and institutions has increased. In this paper, we explore the origin and characteristics of the German “dual system” education model, combine the current situation and shortcomings of postgraduate training in applied statistics in China, and propose the establishment of an effective school-enterprise cooperation mechanism, optimization of the

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curriculum system, and adjustment of the supervisory team, which are in line with the national conditions of China's cultivation methods and education system of applied statistics talents. It provides valuable references for the improvement of the education mechanism and mode of the postgraduate degree in applied statistics in the context of digital economy.

Keywords: Digital economy; Applied statistics; Dual system; Training mode

1. Introduction

Currently, the digital economy is sweeping the world. Digital technology has become a national core competitiveness, and core digital technologies, equipment, software and important digital economy application sites have become the focus of the great power game.[1] At the technical level, the digital economy includes emerging technologies such as big data, cloud computing and artificial intelligence. With the advent of the digital economy, with the advent of the era of digital economy, statistics, big data and the Internet of Things have been integrated and developed, and statistics has covered all aspects of the national economy and science and technology. In order to meet the development of modern statistics in China and the urgent demand for applied statistical professionals, the major of applied statistics was born.[2] Based on statistical theory and statistical analysis methods, the major combines statistics with related disciplines, compound and practical, and is dedicated to cultivating high-level, compound and practical applied statistics talents who can be delivered to related departments.[3] However, in terms of the current situation of cultivation of graduate students in applied statistics in China, there are drawbacks in the cultivation mode of most colleges and universities, resulting in a serious disconnect between the quality of statistical talents and the needs of the society, and the practical ability of students upon graduation cannot meet the requirements of the government, enterprises and other employers. Therefore, the training program of graduate students in applied statistics needs to be changed and improved.

2. Overview of the origin and characteristics of the “dual system” in Germany

2.1 Origin of the “dual system”

“dual system” is a vocational training model that originated in Germany. The so-called dual system means that vocational training requires that vocational personnel who participate in work must undergo training in two places: one is the vocational school, whose main function is to teach theoretical knowledge related to the occupation; the other is the off-campus training place such as enterprises or public institutions, whose main function is to let students receive professional training in the enterprise in terms of vocational skills.[4] Under this training model, both schools and enterprises cooperate deeply and participate in the training of applied talents, thus producing a group of professional and skilled workers with theoretical knowledge and practical ability for Germany, which became an important factor for the rapid recovery of the German economy after World War II. For this reason, many scholars say that German dual vocational education is the secret weapon of Germany's economic take-off. With the rapid development of the economy and society, the traditional vocational training oriented to vocational skills can no longer meet the needs of the society, therefore, “dual system” personnel training from vocational education to higher education, “dual system” university was born. The emergence of “dual system” universities in Germany has, to a certain extent, alleviated the problem of structural unemployment and contributed to the establishment of an international higher vocational education system in Germany.[5]

2.2 Characteristics of “dual system” training mode

The “dual system” training model gives students a wide choice of specialties, and the theoretical courses in this model are focused on vocational needs, and the theory and practice are integrated with each other, which is more practical. Therefore, the “dual system” training model not only allows students to enter the workplace smoothly upon graduation because of their own curriculum advantages, but also has a significant significance in promoting the economic and social development of Germany.

Unlike the “Theory first, practice second” training model of universities, the most important feature of the “dual system” training model is that it emphasizes both the school and the enterprise, with the school providing theoretical knowledge guidance and the enterprise responsible for the improvement of vocational skills. The school provides the theoretical knowledge and the enterprise is responsible for the improvement of vocational skills, which is

a two-pronged approach to improve students' practical level and employ-ability.

3. The current dilemma of training master of applied statistics

Unlike the direction of degree master's training, the professional master's degree is mainly oriented to the professional needs of economic and social industrial sectors, and cultivates professional talents of specific occupations in various industries. In January 2010, the Academic Degrees Committee of the State Council decided to establish the Master of Applied Statistics , which has been officially enrolled since 2011. It aims to cultivate high-level, application-oriented statistical professionals with solid theoretical foundation and corresponding practical ability, and meet the requirements of government departments, large and medium-sized enterprises, consulting and research institutions, etc. with professional knowledge and skills and background of cross-cultivation in the field.

In recent years, the colleges and universities that have been granted the application of statistics have sprung up, and the enrollment scale has shown a gradual growth. However, since the establishment of China's applied statistics has only been more than ten years, the development has not yet matured and is lacking in many aspects.

3.1 The cultivation objectives is unclear

The professional degree of applied statistics is a degree based on the discipline of statistics, which should be applied and practical in order to meet the urgent needs of China's modern statistics industry for specialized talents in applied statistics. However, in the actual cultivation process, due to the short time of establishment, there is no systematic cultivation program of professional master's degree in applied statistics, and due to the traditional idea of "academic", many cultivation units inherit the cultivation mode of academic degree students in statistics to the cultivation mode of professional degree students in applied statistics, which blurs the cultivation objectives of professional degree students in applied statistics. This is incompatible with the original purpose of setting up the master's degree in applied statistics, which inevitably leads to the fact that the cultivation of talents in this major cannot well meet the needs of the society. Therefore, each training unit should further clarify the cultivation objectives of graduate students in applied statistics and formulate a perfect cultivation program in line with the policy and social demands.

3.2 The curriculum is unreasonable

The establishment of professional degree in China is oriented to the professional demand, therefore, the cultivation mode of graduate students with professional degree in applied statistics should let the theoretical knowledge of statistics and practical ability “go hand in hand”, and the curriculum should be combined with the actual practice, aiming at solving the practical application problems such as data processing and analysis. However, in fact, when setting up the curriculum, universities often have the problem of “emphasizing theory but not practice”. In terms of theory, there are various statistical software in the background of digital economy, and the updates are frequent. Since universities are somewhat closed and not sensitive to the needs of the industry, teachers in universities are unable to keep abreast of the updated statistical knowledge required by the external environment, and therefore, teachers are slow to update their professional knowledge when teaching. In addition, teachers mostly teach in the way of classroom lectures, with a single form of teaching, low flexibility, and insufficient interaction between teachers and students, which not only fails to arouse students' interest, but also has low teaching efficiency; in practice, the practical practice courses are formal and unreasonably arranged, which makes students' learning of statistical software in statistics not deep enough and comprehensive, and their ability to solve practical problems is weak, and their practical application ability is not improved. The practical application ability is not improved, and it is not up to the standard of high-level and composite applied statistics talents of government statistics departments and large and medium-sized enterprises.

3.3 Lack of communication between tutors

The cultivation of graduate students with a degree in applied statistics is a systematic and integrated cultivation process, and the cultivation of graduate students with a degree in applied statistics in Chinese colleges and universities adopts the method of mentorship, in which students mainly rely on the guidance of their supervisors for their on-campus study and the guidance of their off-campus supervisors for their off-campus practice, so the supervisors inside and outside the university should communicate with each other in a timely manner and participate in the research and cultivation plan together to cultivate students substantially and purposefully.[6] As a rule, students' research directions are aligned with their on-campus supervisors. At present, more universities have unclear responsibilities for on-campus and off-campus supervisors, and it is difficult to manage them. The university does not have administrative authority over the off-campus supervisors and lacks binding power over the off-campus supervisors, so the practical training of students sometimes cannot be effectively

guided; in addition, the research directions of the on-campus and off-campus supervisors are usually inconsistent, which leads to a large span of students' learning and increases the difficulty of students' learning; furthermore, the lack of communication and connection between the on-campus and off-campus supervisors and the low enthusiasm of cooperation make the cooperation between them superficial, and there is a disconnection between students' theoretical learning and skills practice. There is a disconnect between students' theoretical learning and skills practice.[7]

4. Practical policy of training applied statistical talents under the “dual system” teaching model

With the recognition of the effect of German “dual system” education model, this education model has been popularized and universities in various countries have adopted the “dual system” training model to realize the educational reform. At present, the cultivation mode of professional degree students in China is at the stage of exploration and development, and the education mode of “dual system” is suitable for the cultivation purpose of professional master's degree. Therefore, this paper critically draws on the German “dual system” education model, and proposes a localized dual training model for graduate students in applied statistics on the basis of China's national conditions.

4.1 Establishing an effective school-enterprise cooperation mechanism

The German “dual system” education system has a distinctive feature in the training of talents, that is, German enterprises have a very active participation in the whole national vocational system. This is due to the following three reasons: firstly, policy protection; secondly, German society regards talent training as a public responsibility of enterprises; thirdly, enterprises regard it as their own right[8]. Although school-enterprise cooperation is a solution to the current problems such as the disconnection between theoretical knowledge and practical ability in the process of postgraduate training in applied statistics in China, at the present stage, School-enterprise cooperation is a mere formality, and the heat of cooperation between the two is difficult to maintain. Therefore, it is particularly critical to establish an effective school-enterprise cooperation mechanism.

On the one hand, enterprises can capture the actual demand of the market for applied statistics professionals faster than universities; on the other hand, only enterprises can provide students with a good practical platform, so that students can be more competitive when they graduate

and can participate in employment and realize their personal value faster. If we want enterprises to take the initiative to play the initiative and improve the participation, universities need to have the sense of change.

“Triple helix theory”[9] believes that in the era of knowledge economy, government, enterprises and colleges and universities are interactive relationships. The government needs to give full play to the role of overall planning and provide legal guarantee for school-enterprise cooperation; enterprises need to clarify their rights and obligations, make full use of various resources of colleges and universities, put forward talent needs, increase financial investment, make students recognize the culture of this enterprise in the training process, improve the retention rate of students and add bricks to their own development; colleges and universities need to coordinate with various departments and fully realize the shortcomings of the existing model. Secondly, to understand the current background of the enterprise's talent situation and the actual needs of the quantity and quality of talents, timely change and adjust the schooling ideas, highlighting the important position of enterprises and institutions in the process of postgraduate training in applied statistics.

4.2 Optimize the curriculum system

The curriculum system is the core of the cultivation program, and the high-quality education content is the cornerstone to ensure the quality of education. Based on the cultivation purpose of postgraduate students in applied statistics, it is reasonable for universities to distinguish the curriculum system of postgraduate students in applied statistics from that of postgraduate students in statistics degree, so as to realize the alignment of the settings of applied statistics majors with industrial demands and the alignment of curriculum contents with professional standards. [10]

As a discipline formed by the intersection of statistics and other disciplines, applied statistics is equally important in terms of theory and application; therefore, in the actual teaching process, universities should not only focus on the cultivation of theoretical knowledge, but also on the cultivation of practical ability. In terms of theory, diversification of teaching methods should be realized, and teachers should adopt more teaching methods such as group learning method, discussion method, etc. In the actual teaching process, university teachers should pay more attention to guiding graduate students to take the initiative and let them find out problems, ask questions and think about them, so as to activate the classroom atmosphere, increase students' interest in learning and gradually form their own innovative thinking; in terms of practice, SPSS, SAS, R STATA and other statistical software are currently popular

statistical software, and are also commonly used by enterprises and institutions when analyzing massive data. Therefore, colleges and universities need to set up special software practice classes to cultivate the software mastering ability of postgraduates, taking the practical problems found by students as the starting point, using theoretical knowledge of multivariate statistical methods, using statistical software to analyze data and process data, and finally getting analysis results. The course is based on the students' theoretical knowledge of multivariate statistical methods, the use of statistical software to analyze and process data, and the final analysis results. Adopting the “academic + practical” curriculum can strengthen students' mastery of theoretical knowledge on the one hand, and enhance students' mastery of statistical software on the other, so as to realize the real integration of theory and practice.

4.3 Adjustment of supervisor team

The correct guidance of the supervisor can maximize the potential and strength of the students, improve their comprehensive quality, cultivate a batch of available talents for the country and provide the society with the required high-quality talents. In order to improve the quality of professional master's training, we can learn from the German “dual system” education model and realize the joint training of mentors inside and outside the university.

In order to strengthen the construction of the tutor team for graduate students in applied statistics, it needs the joint efforts of the government, universities and enterprises and institutions. First of all, the government plays a pivotal role in the implementation plan of the dual tutor system and influences the development direction of the mechanism to a large extent, so the government should give policy guidance and lay the foundation for the exchange and cooperation between tutors from universities and tutors from enterprises. Secondly, for colleges and universities, first of all, we should distinguish the difference between the graduate tutors of applied statistics major and the graduate tutors of statistics academic degree. For the graduate tutors of applied statistics major, we should not only assess their academic ability, but also their professional practical ability, and encourage them to make continuous progress. Only by understanding the frontier technology of the current era and the demand of society for talents in statistics can the tutors better guide students and promote the development of economy and society. Finally, enterprises and institutions should effectively participate in the dual tutor system. As the largest number of enterprises and institutions and the main body with the largest employment demand, the effective participation of enterprises can ensure the effective implementation of the dual tutor model. Enterprises should actively cooperate with universities and establish an effective communication and collaboration

mechanism with universities for internal and external tutors to ensure effective cooperation and communication between them, to eliminate the phenomenon of each one working for itself, and to jointly plan the cultivation of graduate students in applied statistics. The off-campus supervisors can provide practical guidance to the graduate students in applied statistics based on engineering projects, so that the graduate students can get in touch with the possible jobs in the future in advance and improve their adaptability to the jobs. This mode can not only make up for the lack of theoretical knowledge of graduate students, but also enable them to improve their practical ability effectively.

5. Conclusion

With the advent of digital economy, various industries have cross-fertilized with each other, and through the construction and development in recent years, concepts such as big data and cloud computing have penetrated and applied to various industries. In this context, enterprises and governments have increasing requirements and demands for high-level, application-oriented and composite applied statistics professionals. In this regard, it is necessary for universities to introduce the dual system education model to realize the teaching reform of applied statistics professionals and to effectively improve the comprehensive quality of applied statistics professionals with advanced teaching concepts, so as to make up for the demand gap and provide enterprises and governments with the ability to use modern technology to collect, process and analyze data. In order to provide enterprises and governments with applied statistical talents who can collect, process, analyze and mine massive data with modern technology, and achieve high-quality and high-level development of China in the era of digital economy.

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