

A comparative research about the related factors influenced on
the attractiveness of vocational education and training between
China and Germany

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Abstract

This research discusses the factors influencing the attractiveness of vocational education and training (VET) in China and Germany. The research questions include what are the related correlation factors, and do those factors differ in the two countries. The research aim is to examine a phenomenon in modern society. China believes that the German VET system, especially the dual system, is a successful VET model, and we explore whether it is worth learning or borrowing from the dual system. Based on the analysis, suggestions will be made as to how to improve the attractiveness of vocational schools in both countries.

The first research method is the literature review, which is the foundation of the whole thesis, offering the theory background and guidance. The second research method is the historical research, which introduces the historical process of VET development. Thirdly, linear regression analysis is used, according to which collected data about the related factors are tested to ascertain which factors are related to the attractiveness of VET. The fourth research method is comparative factor analysis. When the related factors have been proved, it will be evident whether the factors in the two countries show a significant difference.

Historically, traditional apprenticeships in the handicraft industry have been maintained in Germany and applied to other industries in modern society, while in China, the traditional official apprenticeship has faded with the demise of the feudal dynasty. Under the Confucian cultural background, vocational education has always been less attractive than academic education. In Germany, no matter the traditional religious opinions or the pre-modern philosophy theories, an equality of thought [It is not clear what this means.] has both promoted. Nowadays, especially in the past 20 years, the data analysis shows that in two countries there are different factors influencing the participation rate in initial vocational schools. In Germany, the young population, especially the young male population, has a positive influence on the attractiveness of VET. The youth unemployment rate and the number of completed contracts are both positive correlation factors. In China, results show that female vocational teachers and female vocational students have a positive effect on VET.

The historical factors and the influencing factors in modern society in the two countries are different, and how to improve the attractiveness of VET in the different countries is different. The German VET system is worth taking note of and the Chinese VET system should pay higher attention to learning from it.

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1 INTRODUCTION

1.1 BACKGROUND AND IMPORTANCE

The German VET system (VET) is well known as a dual system model and it has been treated as an inspiration for VET innovation around the world [49]. Many European countries and others are learning from the dual system and cooperating with the German model. The increasing demand for vocational education globally may be led by two main factors: with the development of the global economy and changes following the global financial crisis, the demand for skilled workers with high school education has increased, and the innovation of vocational education has been viewed as an effective policy to solve the social problem of higher youth unemployment [104]. Some European countries, especially in the south, are trying to introduce a similar apprenticeship model to obtain an initial vocational certification [51]. Outside Europe, the governments in some developing countries, especially Asian countries, have tried for a long time to reform the VET system, one main reason being that the economic structure has transitioned from large-scale production into high-quality production, and there is a need for a high level of skills and competency among workers [104]. As the main supply side, the VET system could not meet the demand for a young workforce in the labour market: as a result, those Asian countries are trying to find an effective alternative model of VET [131].

In addition, many international organizations evaluate the dual VET system quite positively, including the International Labour Organization (ILO), the Organization for Economic Co-operation and Development (OECD), the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the World Bank (WB) [104]. Among them, the OECD has stated that in previous years it believed that the key to the development of human resources was investment in universities, and it had underestimated the competence which students could gain from the dual system in high school [104]. In addition to the organizations, many Asian countries' governments also prefer to cooperate with or to borrow from the German dual system. The table I.1 shows that the German institute BIBB (Bundesinstitut für Berufsbildung/ Federal Institute for Vocational Education and Training) has cooperated with many Asian countries and international organizations to offer German vocational education experience and guidance. The Central Institute for Vocational and Technical Education in China (CIVTE) is a result of cooperation between the Chinese and German governments in the field of VET. Its main research missions are to focus on policy consultation and develop Chinese vocational education, including the VET system, vocational teachers' training, vocational curriculum development and some related topics.

Based China and many other Asian countries and international organizations believe that the German dual system is a good vocational education model and it is worth learning from it. However, in recent years, doubt has crept in as to whether it is feasible to apply the dual sys-

Countries/Organizations	Institutes
Asia countries	
China	Central Institute for Vocational Training and Education (CIVTE)
India	Federation of Indian Chambers of Commerce and Industry (FICCI)
Korea	Korean Research Institute for Vocational Education and Training (KRIVET)
Philippines	Technical Education and Skills Development Authority (TESDA)
Singapore	Institute for Adult Learning (IAL)
Vietnam	National Institute for Vocational Educational and Training (NIVET) Directorate for Vocational Education and Training (DVET) Ministry of Labour, Invalids and Social Affairs (MoLISA) Deutsche Gesellschaft Für Internationale Zusammenarbeit (GIZ)
International Organizations	
CEDEFOP	European Centre for the Development of Vocational Training
UNESCO-UNEVOC	International Centre for Technical and Vocational Education and Training

Table 1.1: The cooperation partners with German vocational education and training system in Asia countries and international organizations

tem in another country. The German local researcher Deissinger has said that only focusing on the two learning places (training companies and vocational schools) seems short-sighted: the German vocational education system is a complex system and it has been influenced by many factors, including historical and cultural factors, institutional responsibilities, industry, employers, etc., and it is highly dependent on a good economic and labour market environment [51]. It is not easy to just apply one system in another country: there are a lot of related aspects that need to be considered. This research will compare the vocational education systems in China and Germany from the historical aspect first, to compare the different cultures in the two countries.

In modern China, the attractiveness of vocational education is lower compared with general education. Participation in vocational education has always been lower than in general education, whether at high school or university level. The fig.1.1 and fig.1.2 show the number of enrollment students in high school level and university level from 2000 to 2019 in China. During the most period, there are more students choose general education than vocational education in the past 20 years, however, in 2009 and 2010 the enrollment students in initial vocational schools was higher than general high schools. Since 2000 to 2010, the enrollment students in initial vocational schools has increased 113.2% and since 2010 to it has decreased 31%.

The gap between vocational school and high school is as well as increasing, while the situation at university level is a little different. In 2019, the number enrolling in technical college was greater than the number enrolling in normal universities, the main reason being that the government decided to enrol one million more students in technical colleges. The new policy has proclaimed that in 2020 and 2021 this number will be increased by two million.

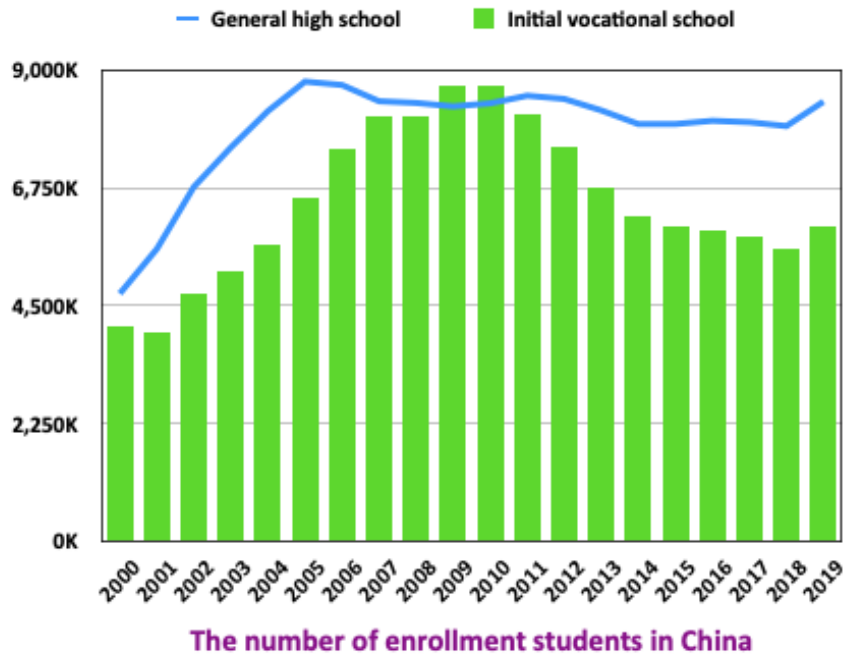


Figure 1.1: The number of enrollment students in high school level in China 2000-2019

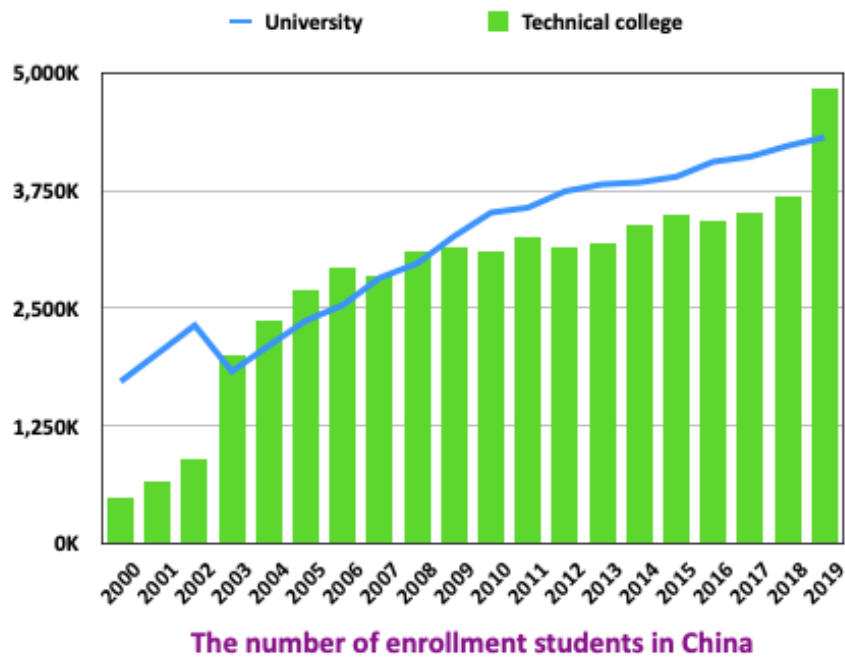


Figure 1.2: The number of enrollment students in university level in China 2000-2019

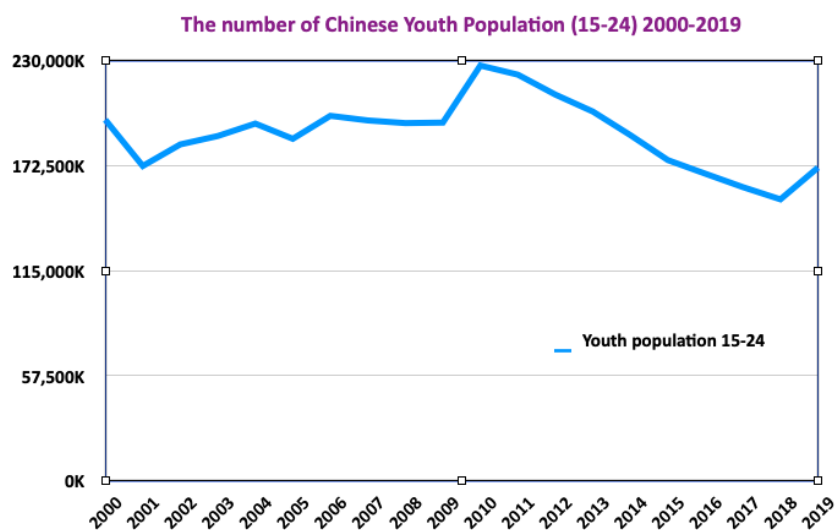


Figure 1.3: The number of Chinese Youth Population (15-24) 2000-2019

Fig. 1.3 shows the Chinese youth population (ages from 15 to 24) from 2000 to 2019, and it is the main population who take part in senior high school and higher education level' colleges in China. In 2000 the youth population was around 198 million in China, there was around 2.4% enrolled into general high school, 2.06% in initial vocational school, 1.12% in general university and 2.46% in technical college. In 2010 there was around 227 million youth population, among them the number of students enrolled in general high school was 3.68%, in initial vocational school was 3.83%, in general university was 2.91% and in technical college was 1.37%. From 2000 to 2010, except the enrollment number in technical college has been decreased, no matter the whole youth population or the enrollment number in the last three types of schools has been increased. In 2019 the whole youth population has been decreased around 171 million, 4.90% enrolled students in general high school, 3.50% in initial vocational school, 2.52% in general university and 2.82% in technical college. The changes of youth population in China had a waved trend in the past 20 years, and in 2010/2011 it reached into top. No matter how it changes, the development of high school has increased stability and the enrollment students in initial vocational school has also changed into top around 2010. While the enrollment student's' proportion in technical college has an opposite trend, in 2010 it has decreased around 44.31% (from 2.46% to 1.37%) and in 2019 it has increased 105.83% than 2010. The higher education level of vocational education has been promoted in recent years in China. In high school education level, the government is promoting an equivalent proportion about students numbers between general high school and initial vocational school.

Initial vocational education normally provides the skills training for youths to enter a specific occupation or sector for the first time, as well as it orients to the needs of the market [212]. However, in all countries, it is a concept undergoing continuous development, and now it is not only treated as a vocational pathway but also as a path connected with academic

education [73]. Germany has a high level of participation in initial vocational education and training through the dual system [73] and one of the participation qualifications in this system for students is finishing compulsory education around 15/16 years old. It is also suitable in China that all students should finish the nine years of compulsory education and then choose to participate in vocational education or general high school. Vocational education could improve youths' skills and competence and promote mobility in the labour market, as well as fostering relationships with other individuals and recognize their achievements [163]. Generally, the IVET (Initial Vocational Education and Training) starts at high school level, and there are three main forms of provision across the different countries [73]:

- vocational (school-based learning);
- apprenticeship (working-based learning);
- special programs (principally aimed at those in danger of social exclusion).

The school-based learning method has been viewed as an effective pathway to allow youths to obtain skills or competencies and enter into the related labour market, as well as to pursue higher education [73]. It is also the situation in modern Chinese vocational education, while in Germany there is a good combination of school-based and work-based learning, which is the dual system. Those two forms have equal status, while in China, where general education is provided separately, the case is different. What's more, there are also full-time vocational schools in Germany which can provide general education to help youths pursue higher academic education.

It could be seen in the fig. 1.2 that the number of participants in initial vocational schools in China has changed in the past 20 years. There was an obvious increase before 2009/2010, and since then the number has reduced. When considering the German participation in initial vocational, is there a similar problem? The number of enrollment students in the initial vocational education schools in Germany has been decreased 1.39% (from 2,681,837 to 2,644,421¹) from 2000 to 2017, it is in a quite stable level.

¹The data comes from the German Statistic Yearbooks.

1.2 RESEARCH GAP

In the past almost 20 years, participation in initial vocational schools in the two countries has been totally different. China shows a change trend, and since 2010 the number has decreased significantly, while in Germany it has decreased by around 1.39%. The German VET system is successful in terms of attracting a stable number of students to ensure a stable participation rate, and it is important to ascertain what the possible indicators are to keep such a stable situation in Germany. Research related to this topic mainly focuses on the analysis of historical and modern factors. From the historical aspect, Deissinger believes that the main characteristics of the dual system, such as dualism of learning place, public responsibility for the legal system and vocational training, the principle of self-control, private training commitment, etc., are influenced by the German history and culture [49]. From the modern aspect, there are various topics to introduce the German VET system—for example, the target of education, training qualification, vocational teachers' training, cooperation between government and enterprises, etc [62].

Introduction of the German VET in China is quite a popular research topic: there are 152 papers on the German VET topic searching CNKI from 2000 to 2019² from 2000 to 2019. Fewer than 1% papers have applied the empirical research method. There are two main reasons for this:

- the definition and form of VET are different across countries;
- and there is no standard approach to data collection, which limits comparability [163].

Most comparative researches in China on this topic prefer to use a literature review method. Other research methodologies, especially quantitative and qualitative researches, are almost non-existent. Searching international websites about this subject, such as Google Scholar, there is a similar problem in that there is a shortage of empirical research comparing Chinese and German VET.

In addition, most Chinese papers assume that the German VET system experience is worth borrowing. Researchers have analysed all aspects of the system and have discussed which parts could be applied in the Chinese education system—for example, the foundation of vocational schools, ways of school-enterprise cooperation, training methods for vocational teachers, etc. However, without the support of empirical research, it is difficult to draw a conclusion about copying one country's experience in another country. Empirical experience is normally obtained by direct or indirect observation or empirical experience, and it can be analysed quantitatively or qualitatively. Empirical research in education is also an explicitly developed approach which is realized in ongoing research [15].

²China National Knowledge Infrastructure (CNKI), launched in 1988, is an electronic platform created to integrate significant Chinese knowledge-based information resources. As a result, CNKI is the most authoritative, comprehensive, and largest source of China-based information resources in the world, reflecting the latest developments in Chinese politics, economics, humanity and social science, science and technology. Website is 'https://kns.cnki.net/'.

Improving the attractiveness of initial VET and encouraging more students to choose vocational education has been a hot topic in Europe in recent years, especially following the Copenhagen process. Some scholars have analysed the factors influencing the attractiveness of VET in European countries: these are related to reputation, recognition between vocational education and general education, training for vocational teachers, vocational enhancement, and other factors [177]. Some policies, concepts and practices from European vocational education have also been introduced into China [179] [193]. Those researches only use a literature review method, or the depth of the comparative research is superficial, depending on reports or policy analysis without supporting data. It is important to make it clear whether it is necessary to borrow from other countries and, if so, what we can learn.

The Chinese and German VET systems have two different forms. China is mainly based on school learning, and Germany has the dual system. The two kinds of system are influenced by the two countries' history and culture, while modern social, economic and political factors, for example, could also influence the development pathway of VET. This research will first describe the two countries' historical process in relation to VET through a literature review methodology, and then analyse possible factors influencing the attractiveness of initial vocational education through a linear regression analysis. The combination of these two methods is a research innovation on the topic of VET in these two countries. The target of this research is to display indicators affecting the attractiveness of initial VET as comprehensively as possible and to make a comparison to show the different factors in the two countries, looking ultimately at what the two countries could learn from each other, instead of only China learning from the German experience.

1.3 TOPIC OF RESEARCH THESIS

There are two indicators that can be used to measure VET attractiveness: the participation rate in VET and the image of VET [36]. Here, the first measurement is applied: the attractiveness of initial vocational education and training is represented by the participation rate in initial vocational schools in China and Germany. The introduction part has stated that there is a limitation, in that because of the lack of a standard approach to collect empirical data, it is difficult to make comparisons between two different countries. To solve this problem, this research will use second-hand data to support the empirical research. All collected data are secondary data and so, theoretically, every use of existing data could be marked as secondary data analysis [22]. Smith has expressed the belief that secondary data analysis is an underutilized methodology in social science, and the existing data analysis could be used multiple times, exploring different aspects [173]. There are not as many quantitative researches about vocational education as about general education in China; thus secondary data analysis in vocational education is necessary and meaningful.

A research topic branch in China is learning from the German VET system to improve the VET system in China. There is cooperation between the two countries in many social aspects, like trade, education activities, etc., and researchers try to transfer some policies of the German dual system to China [9]. They also give related suggestions on innovations in the Chinese VET system—for example, granting more autonomy to different regions and introducing similar institutions for technical education (ITE) [9]. First of all, we should make it clear what is the origin of the VET system in the two countries and which factors could influence students' choice of vocational schools, looking at whether the indicators in the two countries have similarities or are totally different. If they have similar influencing factors, we could consider borrowing experience from other countries to some extent. If the factors are totally different, however, it is not unrealistic for them to learn from each other.

There is scant research on how to improve the attractiveness of initial VET. As a result, direct theoretical literature is difficult to find. This research will not contribute to a new theory but will borrow literature from other branches of education, especially from higher education. To establish a data collection standard in the two different countries, the US students' college choice model will be used here [155]. This is because:

- against the education globalization background, both countries have been influenced by American education research and the topic of student choice has been considered most in the United States [146]. As a result, it is a good reference point.
- In addition, the purpose behind improving the attractiveness of VET is to develop vocational education into one kind of high-quality higher education [36].

Thus, it is possible to apply the higher education model to VET, and a more detailed literature review related to students' college choice will be pursued in the following chapters.

One ambition of this thesis is to test whether it is necessary for China to treat the German

VET model as a paradigm for imitation. It is also helpful to think about why many countries cooperate with the German government in education building, but the dual system is only success in German-speaking areas. The research questions are as follows:

- What are the historical processes for VET in the two countries?
- How have these historical factors influenced the development of VET systems?
- What are the related factors that influence the students' participation rate in initial vocational schools?
- Do China and Germany have similar or different indicators? What is the difference between them?
- What and how can the two countries learn from each other's VET experience?

This research will combine the history with empirical and comparison research methods to solve the research questions with a view to improving the attractiveness of initial VET, making up the research gap left by empirical research in the Chinese VET academic area, presenting a case showing why the German dual system is not suitable for China, and demonstrating that the Chinese VET system has its own specific characteristics which could perhaps be transferred to Germany in some respects.

1.4 HIGHLIGHT THE APPROACH AND PRINCIPAL FINDINGS

Based on the research questions, four main research methods will be used in this research. The first is the literature review. Building the research on the topic and relating it to existing knowledge is the building block of all academic research activities, regardless of discipline [174]. This research is based on the collection, management and analysis of vocational education literature. The main research resources come from journal papers, government reports, academic works and related website information. This method is used in Chapters 2 and 3 to determine the historical development of VET in the two countries, and in Chapters 4 and 5 to provide a theoretical model for the empirical research.

The second method is historical research. Historical comparison refers to comparison of the development and change of the same thing in different periods. It is developed in a time sequence, emphasizing the development and change process to study the law of educational development and change, reveal the historical evolution process, and clarify the ins and outs of the development of VET [197]. It is also a vertical historical comparison, describing the processes underlying the historical development of vocational education individually in the two countries and concluding the possible influential factors.

The third method is linear regression analysis. Linear regression attempts to model the relationship between two variables by fitting a linear equation to observed data. One variable is considered to be an explanatory variable, the other a dependent variable [138]. This method is used here to analyse the relationship between possible factors and the participation rate in initial vocational schools, looking at which factors have a relationship with the dependent variable and which factor is the most positive or negative factor. The results will be tested, and the related explanations will be displayed in the coming chapters.

The fourth method is comparative research. The comparative study analyses and compares two or more objects or ideas. Comparative studies demonstrate the ability to examine, compare and contrast subjects or ideas. Comparative study shows how two subjects are similar or how they are different [25]. The basic structure of this thesis is a comparative study, and the research subject is the factors influencing the participation rate in initial vocational schools in China and Germany. It is also a horizontal country comparison to check whether those two countries have similar or different indicators. Furthermore, the t-test analysis method is used here to compare similar influenced factors in the two countries and check whether or not they have a significant difference.

The research structure is shown in the following figure, which includes the research topic, research process and research results. There are seven chapters in the research. Chapter 1 is a brief introduction which mainly introduces issues including the background and importance of this subject, the research gap in this area, the research topic questions and methods, and the research structure and objectives.

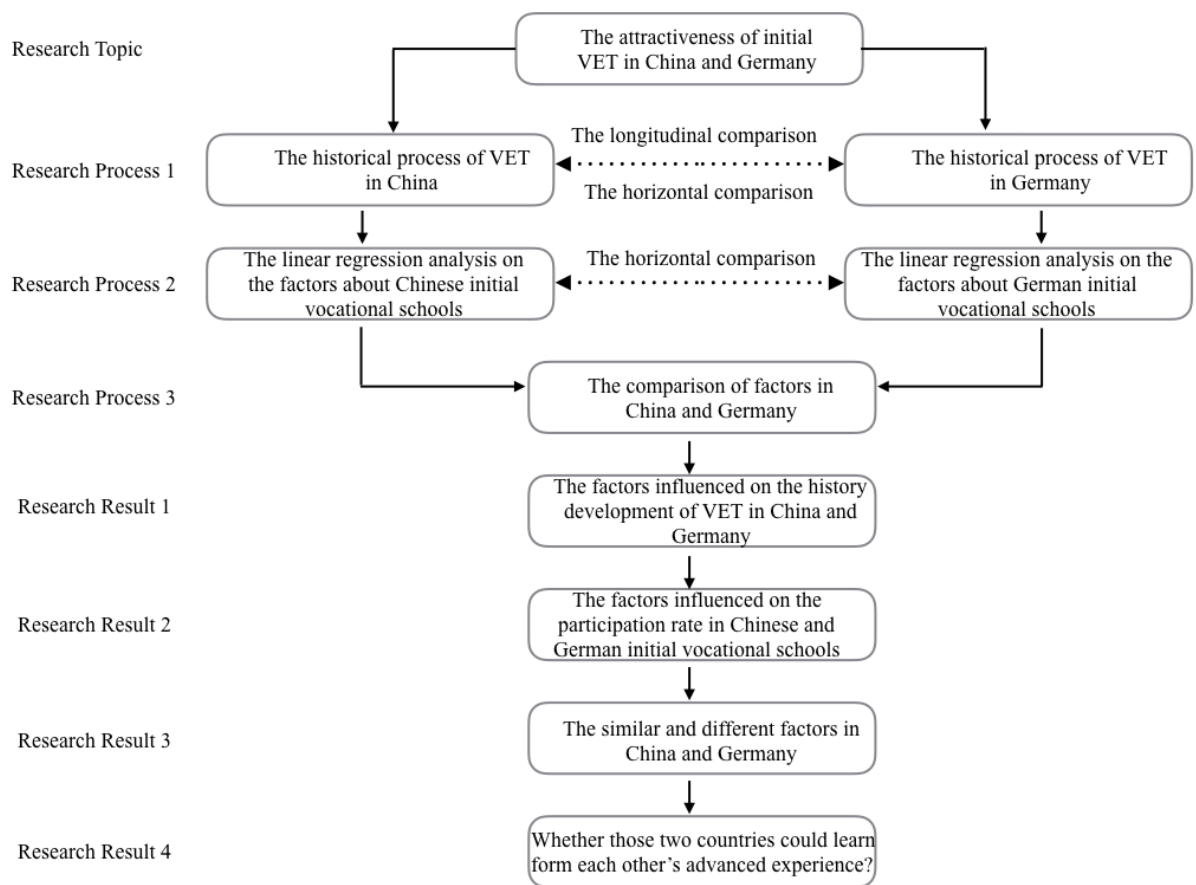


Figure 1.4: The research outlook

Chapter 2 mainly discusses the historical development of VET in China, and it describes three main periods of change: the ancient apprenticeship system in the feudal dynasties period (before 1840), the original modern VET system in the transition period (1840-1949), and the modern VET system since 1949.

Chapter 3 introduces the historical development of VET in Germany. It has four main periods: apprenticeship under a guild before 1870, the foundation of modern vocational schools in 1870–1920, exploration of the dual system in 1920–1970, and the foundation of the modern dual system after 1970.

Chapters 4 and 5 analyse the indicators related to the participation rate in China and Germany between 1997 and 2018 using single-factor regression analysis and multiple-factor regression analysis. Collected data come from the Statistical Yearbook published in the two countries.

Chapter 6 is the comparison part. The possible indicators are collected and checked in the previous chapters and will be compared in this chapter to ascertain what are the similar or different influential factors; t-test analysis will test whether the changes of similar influenced in two countries have a significant difference or not.

Chapter 7 contains the discussion and conclusion. In relation to the last research question, whether the two countries could learn from each other will be demonstrated here. More details about the results to the research questions, the relevance and importance of the research results, the limitations and further research questions will be stated.

1.5 HYPOTHESIS AND OBJECTIVES

According to the collected literature and data, various factors are thought to influence the attractiveness of VET. Firstly, there are historical and cultural factors. In the ancient period, it is interesting that the model of vocational education in China and Germany was a similar apprenticeship. The difference is that apprenticeship in China has been always controlled by the government, especially the central government, while in Germany it was controlled by the guilds. When the apprenticeship transitioned into modern society, the model in China was totally replaced by a school-based modern vocational school, while in Germany the apprenticeship was saved and co-existed with the modern vocational school. Furthermore, after a long exploration, the dual system was set up in Germany until today, and it has become an advanced model for the foundation of vocational education. However, it has developed into a model mainly dependent on the school-based system, and many researchers believe that we should learn from the German experience [120]. On the one hand, there is research that shows a lot of replications of the German dual system, but most of them failed [199]; on the other hand, there is no empirical research supporting the application of the dual system in China. As a result, more research is needed to find why the duplication of the German dual system in other countries has been less successful and to ascertain whether China could learn from it.

The assumed influential factors not only include the historical aspect, but also involve some modern society problems which could influence the participation rate directly, such as changes in the demographic [162], gender issues [186], vocational teachers' training [38] and so on. Those factors will be tested using ordinary least squares (OLS) analysis to find which are the most positive and negative in the two countries individually. Upgrading the method of training vocational teachers may improve the teaching quality in vocational schools, thus achieving the purpose of increasing the attractiveness of vocational education. The gender issue exists among both students and teachers, and it is important to provide an equal environment to obtain study and work opportunities. The population problem is different in the two countries: the fertility rates in China and Germany were 1.7% and 1.6% respectively in 2018. Since 1997, there has no significant change in the population in China, whereas in Germany it has increased by 25.9% (from 1.35% to 1.6%).³ It is interesting to examine whether this has influenced the attractiveness of VET in the past years.

Faced with some failed cases of borrowing from the German dual system [199], there is an assumption that the influential factors in China and Germany are different and that China cannot learn from the German system directly. Factor analysis will check whether this assumption is correct and the extent to which factors are similar or different. If they have similar indicators, then it is possible to consider borrowing from each other.

Corresponding with the research questions, there are several research objectives in this

³Source comes from the World Bank: <https://data.worldbank.org/indicator>.

thesis. Firstly, the study aims to investigate the objective factors related to the attractiveness of initial vocational education in China and Germany. It also aims to analyse the results of the research to determine the possible positive or negative indicators of this kind of research for student choices in initial vocational schools.

Secondly, there is little empirical research analysing the attractiveness of VET, especially in Chinese research. Chapters 4 and 5 in this study will use qualitative analysis to find the research results from the modern social aspect indicators and try to make up this research gap.

Thirdly, this research will discuss why the German dual system is well-known around the world but has often failed when it has been transferred to other countries. It will provide a case analysis and discuss whether it is necessary for other countries to learn from the German experience.

2 THE ORIGINAL, DEVELOPMENT AND CURRENT SITUATION OF THE VOCATIONAL EDUCATION AND TRAINING IN CHINA

2.1 INTRODUCTION

Chapter 2 mainly introduces the origins of the Chinese VET system in the feudal period, the development of the modern VET model in the transition period between feudal and modern society, and the current situation of the modern VET system. The main division is based on the timeline and describes the characteristics of VET in different periods. In this part, through historical research, we aim to identify changes in the trend for vocational education and the possible factors which have influenced its popularity.

Recently, China has been in a critical period of economic transformation which will transform China from a manufacturer of quantity to one of quality. One of the key factors for the successful transformation is a sufficient supply of highly skilled talent in the labour market, and the VET system has been seen as an effective way to cultivate a skilled labour force to help youths transfer from schools to workplaces [201]. At the same time, it is also believed that VET could help students find jobs to match their training experience better [201]. Because the lack of skilled workers is becoming an increasingly serious issue, the Chinese government has paid more and more attention to the development of vocational education in the past years. Influenced by the popularization of higher education globally, higher education is far more attractive than vocational education in China. To increase the attention given to VET, the government has encouraged more senior high school graduates, retired soldiers, laid-off workers, migrant workers and so on to choose vocational education, and in 2019 there was a large-scale expansion of enrolment in higher vocational schools of a million people. There is no doubt that VET is less attractive for a number of historical and cultural reasons.

In the following, the author will outline some research questions and research targets for this chapter.

- The main research question is about the type of vocational education in different periods in China—whether VET has always been a less attractive type of education or if it was popular before. Based on different types of VET, the author explore the changes and developments behind them and examine what is the main driving force for those differences.
- Naturally, the main research target is to find the possible indicators influenced by changes in VET in China in different stages, the indicators perhaps being related to economic, political, sociological and cultural aspects. This research is comparative research, and the following chapters will explain some related factors in Germany's VET system. Af-

ter comparison and analysis, the thesis will give a final result on whether it is worth the Chinese VET system learning from the German dual system and what the two education systems could perhaps learn from each other.

The main research methods and the research structure of this chapter are as follows.

- The historical and logical method is a basic research method in educational theory [72]. History here refers to the historical process of the development of vocational education itself and the process of development of human awareness of vocational education. Logic refers to an overview of the historical process of the development of vocational education in cogitation. Thus the historical and logical method refers to research on the concept of vocational education to analyse, summarize and deduce its historical process and to understand the essence of vocational education.
- The fig 2.1 shows that according to the sociological and historical timeline there have been three main changes in VET. The first stage was in ancient times, where VET was in the form of an apprenticeship system. The second stage was the transition period between the feudal and modern society and the beginning of modern school education. The third stage is in the modern society and explains the development of modern VET in China.

At the end of this chapter, the features and the related influential factors will be concluded, along with the reason why, in modern China, vocational education is less attractive than higher education.

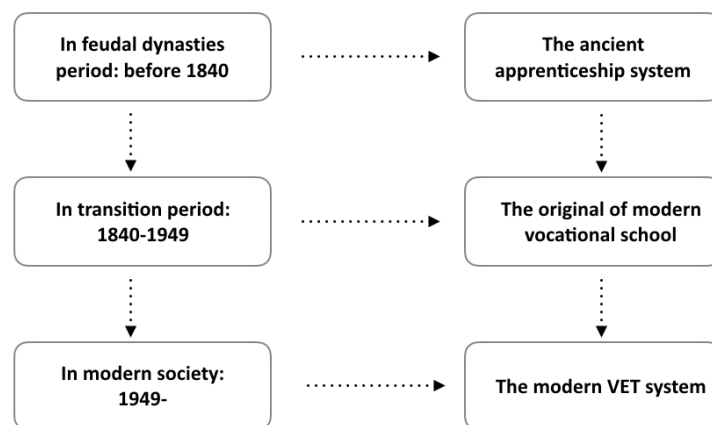


Figure 2.1: The research structure in chapter 2

2.2 THE APPRENTICESHIP SYSTEM IN ANCIENT CHINA

Looking back to the histories in the different countries, vocational education did not originate from school education but was a kind of field training. Apprenticeship was the only system to spread and retain some aspects of influence on the VET system in modern society. Under an apprenticeship, ancient Chinese working people continually transformed agricultural technology into productive forces that promoted the development of agriculture: this not only promoted the development of ancient agriculture in China, but also made for a profound agricultural civilization. What's more, the traditional apprenticeship system also played a very important role in developing ancient Chinese manual techniques and knowledge. In the heyday of the Chinese feudal period, the Tang dynasty, the apprenticeship system was divided into an official apprenticeship system and a local apprenticeship system. Local and central governments managed the government-owned handicraft industry uniformly [98]. Official workshops selected skilled craftsmen from various places to ensure the level of those professional masters. In the following period, the Song dynasty, apprenticeship was developed into the 'central – local – private' model, and the government created one new training method, Fa Shi. The related officers compiled basic operating specifications and technical knowledge into a book, and the masters should teach those skills according to the book [210]. In the middle and late Ming dynasty, with the development of the commodity economy, capitalism appeared in some areas, and even though the private apprenticeship was still popular, apprenticeships controlled by the government gradually declined.

2.2.1 THE APPRENTICESHIP IN XIA-SHANG-ZHOU PERIOD AND SPRING AND AUTUMN PERIOD

As we know, China is one of the countries where global civilization originated, and in the Xia-Shang-Zhou period⁴ there was a significant phenomenon whereby the population's last names were determined by their profession and people from the same profession lived together. According to Zuo Zhuan⁵ there were families named Pottery, Rope, Lock and so on, who would have worked as potters, rope-men, or locksmiths at that time. In addition, in this period, the government controlled the right to skills learning and it had an absolute monopoly on education [109]. This was the beginning of human society, and with the development of productivity, social products could meet the requirement of normal people's lives. At the same time, with the appearance of surplus products, some people became managers of the society [134]. Those kinds of group become the exploiting class and they controlled school education, focused on imparting knowledge, and vocational education, focused on imparting craftsmanship: at that time, when the words were not yet popular, those techniques could only rely on the transition from father to son, generation to generation. It was

⁴The timeline is divided from 2070 B.C to 770 B.C. And the division standard is based on the Xia-Shang-Zhou Chronology Project. It was a multi-disciplinary project commissioned by the People's Republic of China in 1996 to determine with accuracy the location and time frame of the Xia, Shang, and Zhou dynasties. Source: Wikipedia.

⁵The Zuo Zhuan, generally translated The Zuo Tradition or The Commentary of Zuo, is an ancient Chinese narrative history that is traditionally regarded as a commentary on the ancient Chinese chronicle Spring and Autumn Annals. Source: Wikipedia.

also the original form of Chinese apprenticeship.

When it came to the Spring and Autumn period,⁶ Chinese society was split into several small countries and there were constant wars. During this period, most countries treated the small peasant economy as the economic foundation of a country, and they paid more attention to agricultural production. The development of agriculture increased the level of productivity; the phenomenon of education being controlled by the government was broken, and some craftsmen began to create private schools and recruit apprentices, which signalled the beginning of a new form of apprenticeship²⁰⁴. There is an old saying about this period, the translation of which is that when the emperor has a problem with dereliction of duty, the culture and academia originally controlled by the emperor will disperse. The government's monopoly on education and technology inheritance was broken⁷⁹, and against this background, some agricultural officials began to transfer their agricultural skills to private schools.

It is worth mentioning that a special cultural phenomenon happened during this period, named the Hundred Schools of Thought⁷

and Confucianism appeared in this period. This has profoundly influenced lifestyles and social consciousness up to the present day, not only in China but also in East Asian countries and the East Asian diaspora around the world. Confucianism, also known as Ruism, is a system of thought and behaviour originating in ancient China, variously described as tradition, a philosophy, a religion, a humanistic or rationalistic religion, a way of governing, or simply a way of life²⁰⁶. There is an old saying from the Analects⁸ "if somebody has read more than 300 poems and you give him some political affairs, he still could not finish it; send him to work abroad, he could not deal with it alone; even though he has learnt a lot, there is no help for the real work." The meaning behind this is a new concept of learning in that era in which everyone should apply what he learns in practice. This is viewed as the original idea about the application of apprenticeship¹⁹⁰ and involves some thoughts about approaches to passing on handicrafts-men's skills¹⁹:

- Hands-on learning. This means during teaching time the teachers should impart knowledge orally, at the same time setting an example in action. Teachers' speech and be-

⁶Spring and Autumn period was a period in Chinese history from approximately 771 to 476 BC (or according to some authorities until 403 BC)⁴ which corresponds roughly to the first half of the Eastern Zhou period. The period's name derives from the Spring and Autumn Annals, a chronicle of the state of Lu between 722 and 479 BC, which tradition associates with Confucius (551–479 BC). Source: Wikipedia.

⁷The Hundred Schools of Thought were philosophies and schools that flourished from the 6th century to 221 BC, during the Spring and Autumn Period and the Warring States period of ancient China. An era of great cultural and intellectual expansion in China, it was fraught with chaos and bloody battles, but it was also known as the Golden Age of Chinese philosophy because a broad range of thoughts and ideas were developed and discussed freely. This phenomenon has been called the Contention of a Hundred Schools of Thoughts ("hundred schools contend"). Source: Wikipedia.

⁸The Analects (meaning "Selected Sayings"), also known as the Analects of Confucius, is an ancient Chinese book composed of a collection of sayings and ideas attributed to the Chinese philosopher Confucius and his contemporaries, traditionally believed to have been compiled and written by Confucius's followers. Source: Wikipedia.

haviour should play an exemplary role.

- Teaching/learning according to the mind. This means that the teaching process depends on both the words and individuals' minds. Everyone will have different understanding of the same knowledge.
- On-site teaching. This suggests that the teaching process should take place where production activities happen and develop. This is a form of teaching still applied today.
- Family-like relationship. This is the origin of the master-apprentice relationship. With the development of private schools and productivity, masters began to adopt 'sons' and transfer their skills; thus this relationship looks like a father-son relationship.

In general, this period denotes the slave society of Chinese history. The thought of agriculture was formed and developed during this period. Most agriculture and handicraft skills were passed on through the official and private schools, forming the foundation of the ancient apprenticeship in China.

2.2.2 THE APPRENTICESHIP IN FEUDAL PERIOD

China was ruled by feudal dynasties for more than 2000 years, and during this period of domination there were 83 feudal dynasties in total. This part of the study will pick up several dynasties with special features pertaining to the development of apprenticeship.

The establishment of the Qin dynasty⁹

in 221 BC marked the beginning of the feudal society in China. The Qin dynasty continued agriculture-based thought and paid more attention to the development of agriculture. At the beginning of the next dynasty, the Han dynasty¹⁰ the government promoted the policy of recuperating and building up strength, referring to encouraging the development of agriculture and reducing some kinds of tax. Against this background, the productivity of agriculture, animal husbandry, etc. was greatly improved and experts on the management of agriculture began to appear [70]. A local official named Fan Shengzhi in the late Han dynasty taught local people farming skills, resulting in a good harvest. Later, he compiled many years' agricultural experience into a book named the Book of Fan Shengzhi, recording agricultural production knowledge such as farming principles, crop cultivation techniques and seed selection in the middle area of Yellow River. It was the earliest technical agricultural book written by an individual in China and it promoted more systematic and specialized agricultural skills training.

During the Qin and Han dynasties, handicraft products had to be engraved with the name of the craftsman to ensure the quality of the product. Furthermore, there was a system for workers' training in the handicraft industry, and different types of worker had different regulations on work time. During this period, official and private apprenticeships developed faster than before: the educational content was more specific, the training period was more flexible, the organization and management mechanisms were better, and they even had strict assessment standards. In general, in the Qin and Han period, apprenticeships were still scattered not a complete system, and the focus was mainly on the agriculture and handicraft industries.

The Sui and Tang dynasties^{11,12} were the most prosperous periods during the whole Chinese ancient feudal society. Agricultural techniques developed further, and official handicraft

⁹The Qin dynasty was the first dynasty of Imperial China, [66] lasting from 221 to 206 BC. Source: Wikipedia.

¹⁰The Han dynasty was the second imperial dynasty of China (206 BC–220 AD), preceded by the Qin dynasty (221–206 BC) and succeeded by the Three Kingdoms period (220–280 AD). Spanning over four centuries, the Han period is considered a golden age in Chinese history. To this day, China's majority ethnic group refers to themselves as the "Han Chinese" (Han Zu) and the Chinese script is referred to as "Han characters". Source: Wikipedia.

¹¹The Sui dynasty (581-618) was a short-lived imperial dynasty of China of pivotal significance. Source: Wikipedia.

¹²The Tang dynasty or the Tang Empire was an imperial dynasty of China that ruled from 618 to 907. Historians generally regard the Tang as a high point in Chinese civilization, and a golden age of cosmopolitan culture [118]. The Tang capital at Chang'an (present-day Xi'an) was the most populous city in the world in its day. Source: Wikipedia.

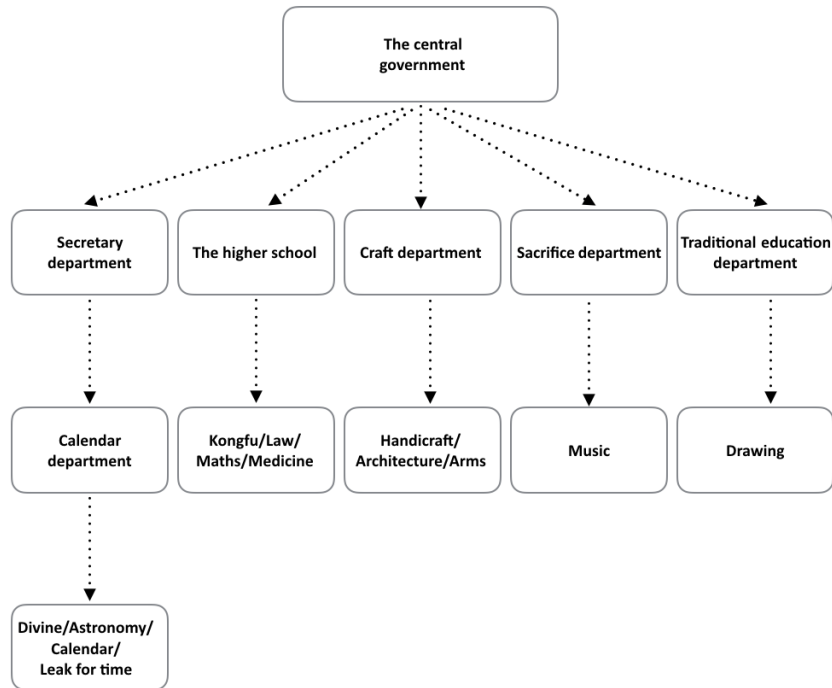


Figure 2.2: The positions about the apprenticeship under the central government in Tang dynasty.

workshops were one of the main methods of production. Many skills in different industries were controlled by the government, which established different official job positions in the central and local governments to constitute the system. As a result, the model of apprenticeship in the Tang dynasty was apprenticeship under the central government, apprenticeship under the local government and apprenticeship under the private guild.

Based on fig 2.2, it shows different occupations which trained skilled workers by apprenticeship, and they were all controlled by the central government; local governments had similar settings with lower level positions. Different professions had different training content and number of training years—for example, wisp workers needed four years, musical instrument players normally needed three years, and cold weapon makers needed two years. The best masters from different industries were recruited and worked for the government. At the same time, they had responsibility for training the next generation of talent. All the masters and apprentices worked for the government after graduation. The apprentices worked as government officers. Working for the government was very much in line with Confucianism, and in ancient times most families treated serving for government as a lifelong pursuit. In the Tang dynasty, the Imperial examination system¹³ was formed, while the number selected

¹³Chinese imperial examinations were a civil service examination system in Imperial China for selecting candidates for the state bureaucracy. Source: Wikipedia.

was limited. For most individuals, the apprenticeship system was also a good choice.

The first guild was recorded in the Sui dynasty. Of course, this organization was not started in the Sui period: it had developed over a long time when there were no records. We can imagine that those guilds were composed of workers in the same career; at first, for convenience, they set up workshops together in one area. Later, it became necessary for them to unite and the guilds were formed. Those guilds had to negotiate with the government, and paid tax to the government. The relationship between masters and apprentices in this period developed further: there were limitations and rules in every guild, and they could decide their training content and timescale. As the guilds had some obligations to the government, the government allowed the guild to have a monopoly in their own industry. Overall, in the Sui and Tang periods, apprenticeships were divided into two types which were controlled by the government and the guilds. According to different job positions, they had different training standards. In this period, the division of handicraft training became more finely tuned.

It is worth discussing information apprenticeships in the Song dynasty further¹⁴

which developed based on the system in the previous Tang dynasty. The Northern Song census recorded 20 million households, double the number in the Han and Tang dynasties. It is estimated that the Northern Song had a population of 90 million people^[54]. The expansion of the population, the growth of cities, and the emergence of a national economy led to the gradual withdrawal of central government from direct involvement in economic affairs. The apprenticeship system in the Song dynasty was inherited from the previous period and the structure was still central – local – private. With the further prosperity of industry and commerce, the guilds developed all around the country and the variety became more detailed. Guilds in the Song dynasty can be divided into three types. :

- The first was the commercial guild. It was organized by businessmen in the same trade, and focused on the sale of goods, such as the fish guild, the meat guild, the fruit guild, etc.
- The second type was the handicraft guild, uniting craftsmen in the same profession. It focused on the handicrafts, like the shoe-making guild, the carpenters' guild, the painters' guild, and so on. They normally had skilled craftsmanship; thus apprenticeship was popular in this kind of guild.
- The third type of guild was not dependent not on skills and had no serious apprenticeships, such as the animal feeding guild.

We can therefore see that apprenticeship in the Song dynasty mainly occurred in the handicraft industry. The government innovated the Fashi training method for better training of apprentices. This was a handbook of technical operations which collected the basic skills

¹⁴The Song dynasty was an imperial dynasty of China that began in 960 and lasted until 1279. It is divided into two distinct periods: Northern Song and Southern Song. The spread of literature and knowledge was enhanced by the rapid expansion of woodblock printing and the 11th-century invention of movable-type printing. Source: Wikipedia.



Figure 2.3: Samples from Yingzao Fashi

from one career in a book. One of the most famous, Yingzao Fashi, records the concepts and procedures of building, functions, design standards, building materials and patterns of ancient Chinese architecture [126]. The fig.2.3 describes one sample from this architecture handbook. On the left is the third chapter which introduces issues such as architectural location and building measuring tools; on the right is one tool and the function of it, to determine the direction of the building.

Generally, apprenticeship in the Song dynasty followed on from the previous system. During this time, with the development of the population, the economy and cities, the guilds developed and more apprentice training tasks transitioned from the government to the guilds. With the creation of Fashi, the skills training method became more specific and the training content and assessment were more reasonable.

The last dynasty discussed in ancient feudal China is the Ming dynasty [15].

With the development of the commodity economy in the middle and late Ming dynasty, some areas began to sprout capitalism. As mentioned before, in the Northern Song, the population was 90 million; in the Ming dynasty, this number changed to 200 million [187]. The further expansion of the population, the growth of cities and the development of the economy led to central government gradually dropping out of direct participation in various affairs. During this period, apprenticeship under the central government decreased while apprenticeship under private guilds further developed.

The first recorded guild hall was in the Ming dynasty and it looked like an office where the guild worked. According to the size of different guild halls, they could be separated into several parts: members from the same rural area, from the same city, from the same province, from adjacent areas, or from the same country, when they were abroad. At the same time,

¹⁵The Ming dynasty, officially the Great Ming was the ruling dynasty of China from 1368 to 1644 following the collapse of the Mongol-led Yuan dynasty. The Ming dynasty was the last imperial dynasty of China ruled by the Han Chinese. Source: Wikipedia.

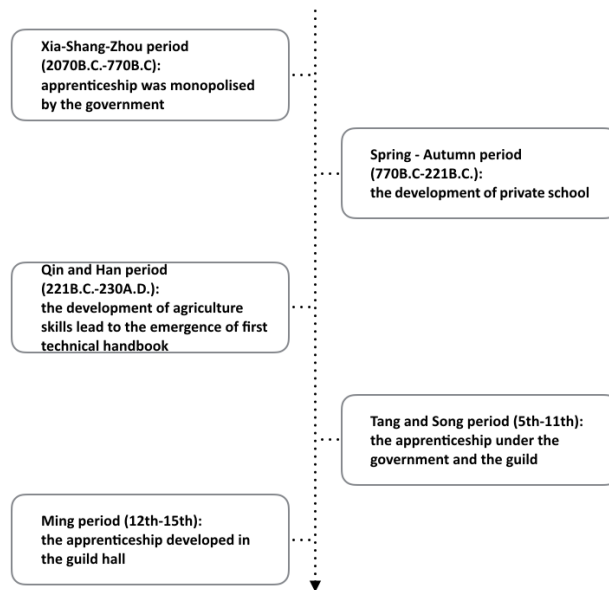


Figure 2.4: The development process of apprenticeship in ancient China.

the guild hall was a training place for apprentices. Guild groups had strict regulations on the number and age of apprentices recruited [119]. Every master could only have one apprentice in every training period, and the training period was normally three years; workshops in the same guild could not hire apprentices who were not graduates, and even those apprentices who had graduated paid a fee to join the guild. Furthermore, the apprentices had to work for their masters for at least one year. Under the norms and functions of the guild system, apprenticeship developed vigorously, gradually transitioning from a private activity to a public system [3]. It also became an ideal technical education model and an excellent social education organization [3].

Fig 2.4 shows the development process of apprenticeship in ancient China. Though it did not belong to the Chinese higher education system, with the development of the society, apprenticeship developed without interruption. It was initially totally controlled by the government, later transitioning into management by the guilds; it also developed from agriculture into all trades and professions, and the number of apprentices expanded. Chinese ancient apprenticeship played an important role in the spreading of skills in various areas of work.

2.3 THE APPRENTICESHIP IN TRANSITION PERIOD

The transition period represents Chinese society transitioning from the ancient period to modern society. Thus there were two periods: the end of the feudal society and the beginning of modern China.

2.3.1 THE APPRENTICESHIP AT THE END OF QING DYNASTY

The Qing dynasty^[16] was the last feudal dynasty in ancient China, and it was also a transition period for China from an ancient to a modern society. The first industrial revolution happened during the 1760s to 1840s and it led to a huge change in productivity and production methods. At that time, there was a trend that machines began to replace humans and animals, and large-scale factory production began to replace manual production. This revolution spread from England to Europe, and then from Europe to the whole world. Capitalist countries seized the market around the world, and those countries spread advanced production technology and experience which shocked the old way of thinking and old local institutions [171]. When the European countries started this revolution, China was at the end of the last feudal Qing dynasty.

The First Opium War^[17]

happened during 1839–1842 and this is viewed as the beginning of modern Chinese history [107]. After the failure of the opium wars, the Qing dynasty was forced to open the trade market, and the dream of Chinese culture as the centre of the world's civilization was broken [132] and since then China has become a semi-colonial and semi-feudal society. China became a semi-colonial and semi-feudal society. The traditional feudal culture was not able to stop the spread of Western countries' culture, and traditional national concepts were broken in the face of conflict with the social reality [132]. There were some enlightened people who began to realize and changed the way of thinking about education. The apprenticeship method of education was based on practice and developed from work experience to knowledge. Faced with the social reality, those people advocated learning advanced technology from Western countries. The first batch of Western learning schools was set up against the background of the Westernization Movement^[18]

¹⁶The Qing dynasty, officially the Great Qing, was the last imperial dynasty of China. It was established in 1636 and ruled China proper from 1644 to 1912. It was preceded by the Ming dynasty and succeeded by the Republic of China. Source: Wikipedia.

¹⁷The First Opium War, also known as the Opium War or the Anglo-Chinese War, was a series of military engagements fought between Britain and the Qing dynasty of China. In 1842, the Qing dynasty was forced to sign the Treaty of Nanking — the first of what the Chinese later called the unequal treaties—which granted an indemnity and extraterritoriality to foreigners in China, opened five treaty ports to foreign merchants, and ceded Hong Kong Island to the British Empire. The failure of the treaty to satisfy British goals of improved trade and diplomatic relations led to the Second Opium War (1856–60). Source: Wikipedia.

¹⁸The Self-Strengthening Movement, also known as the Westernization or Western Affairs Movement (c.1861–1895), was a period of institutional reforms initiated in China during the late Qing dynasty following the military disasters of the Opium Wars. Source: Wikipedia.

from the 1860s to 1890s. The government mainly established schools and factories to learn weapons manufacturing, machine building, scientific knowledge and diplomat training [123]. Those new types of school were treated as the origin of modern VET schools in China. There were three main kinds of schools at that time.

- The first was the language education school. The first school, Tongwen Guan, was set up in Beijing in 1862¹⁹. It provided teaching of four languages: English, French, Russian and German. The aim of this school was to train diplomats to facilitate negotiation with foreigners. Later, several similar schools were established in other cities in China. The talent with language led to the translation of Western newspapers and books: 143 Western books were translated during 1868–1879 [184]. In 1867, natural science courses were added into schools' training content, covering arithmetic, astronomy and algebra [184]. Graduates from those schools played an important role in spreading Western culture and knowledge.
- The main target of the Western Affairs Movement was to develop a military industry, which was one result of the failure of the wars. Several arsenals and shipyards were opened to strengthen the Chinese Navy and army: thus related weapons building and shipping schools were also established in this period. The second and third types of skills training school were military schools and professional technical schools. In military schools, the training targets were military leaders and military-technical talent cultivation, while the training targets in shipping schools were related to navy leaders and technical talents. The first modern vocational school in China was the Fuzhou Shipping School, set up in 1866 by Zuo Zongtang²⁰. The fig 2.5 displays the training process in the Fuzhou Shipping School. It had four institutes in total, and the first period of study was in the manufacturing and driving institutes. Manufacturing techniques were learnt from French teachers: thus the courses included French, geometry, mathematics, calculus, physics, machinery, etc. Driving skills were taught by British teachers and included English, mathematics, geometry, astronomy, geography, nautical theory, etc. In the next period of study, all students learnt in the tube and wheel institute to study engine disassembly technology. After all the theoretical learning, they studied in the practising institute. Students majoring in manufacturing were sent into the shipyard to take part in shipbuilding, while students majoring in driving were sent into the warships to drive. The best graduates would be sent to Europe to continue their study. According to statistics, 659 students graduated in total from the Fuzhou Shipping School.

Even though most schools at this time lacked longevity, they still had meaning for modern vocational schools' development in China. They were all deeply influenced by Western countries, no matter the education content or the school's setting. This was the first time that Western education thoughts were applied in China, and the traditional Chinese educa-

¹⁹The School of Combined Learning or the Tongwen Guan was a government school for teaching Western languages (and later scientific subjects), founded at Beijing, China in 1862 during the late-Qing dynasty, right after the conclusion of the Second Opium War, as part of the Self-Strengthening Movement. [115]

²⁰Zuo Zongtang, (10 November 1812 – 5 September 1885), sometimes referred to as General Tso, was a Chinese statesman and military leader of the late Qing dynasty [103].

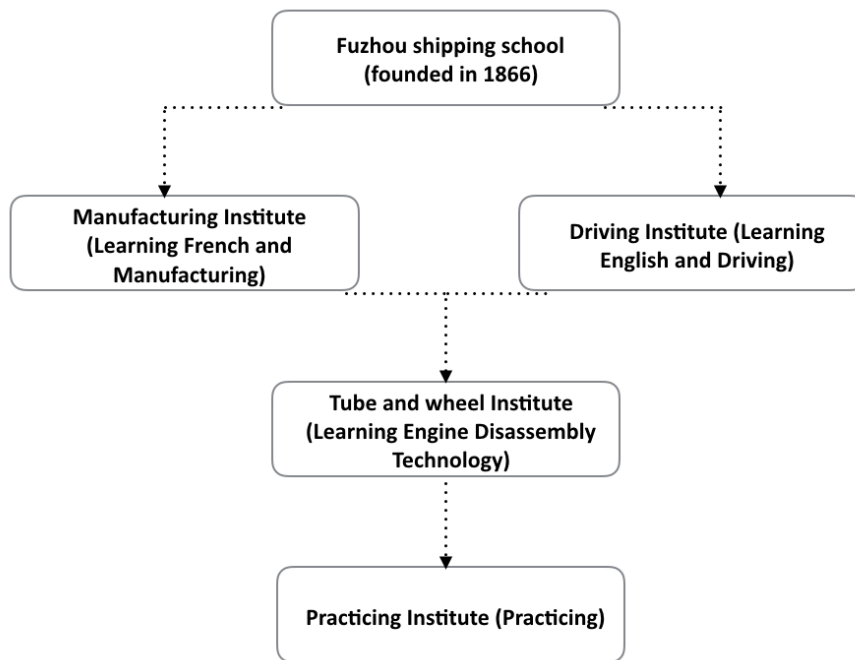


Figure 2.5: The training process in Fuzhou Shipping school.

tion rules were broken. The new industry and technology impacted the traditional education system: vocational education did not exist only in agriculture and the handicraft industry, and with the development of the manufacturing industry, the new type of vocational school also developed. However, during this period, most Western learning was too superficial, and the schools were established alongside related factories. They did not realize the large-scale training of skills by reforming the traditional education system: they learnt only about Western languages, literature and technology, and did not consider the application problems.

At the end of the Qing dynasty, because of the unstable social environment, enlightened people aimed to save their country through a reforming movement. The previous self-strengthening movement was promoted by the traditional landed class, and the subsequent reform movement (1898.6.11–9.21, 103 days) was promoted by those people who graduated from the schools which were set up against the background of the Westernization Movement. Most of those students had experience of studying abroad; they had learnt about the economy, politics, culture and so on in foreign countries, and they believed that all aspects of the country, including economic, educational, political, military and bureaucratic systems, should be reformed to promote China as a constitutional monarchy. This was the first time that a modern Western education system was introduced into China. Simply, three levels of school were opened—primary school, middle school and high school—and all kinds of public or private schools had to learn traditional and Western knowledge at the same time. What's more, various new professional technical schools were added into the education system, such as rail-

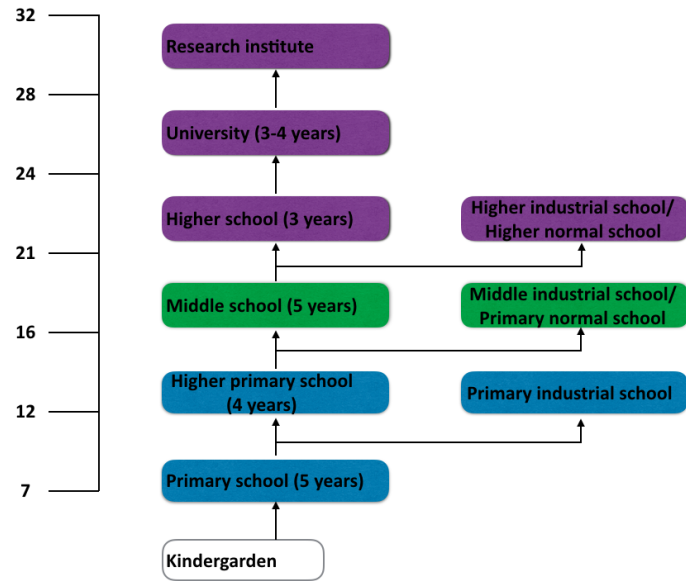


Figure 2.6: The first school system in modern Chinese history

way schools, telegraph schools, sericulture schools and so on. It was also the first time that vocational schools became part of the academic education system, and vocational education no longer simply involved apprenticeships.

Before the end of the Qing dynasty, the last reform movement was the new policy reform of the late Qing dynasty. The most obvious change under this movement in education was that the traditional education system was abolished, replaced by Western-type schools. The first school system implemented in modern Chinese history was created during this period, in 1904 [129]. The fig 2.6 describes the first modern school system, which is obviously influenced by the Western modern school system. The school system is mainly divided into three levels and seven sections. The first level is the primary level, and it includes kindergarden, primary school (4 years) and higher primary school (5 years). The second level is middle school (5 years). The third level is the higher level, which includes high school (3 years), university (3-4 years) and research institutes. This was the first time kindergartens were set up, recruiting young children from 3 to 7 years old. All new vocational schools, like industrial schools and normal schools, were added into the school system. Until the official education and training system was established [158], private apprenticeship used a large proportion of student resources.

2.3.2 THE VOCATIONAL EDUCATION AND TRAINING IN REPUBLIC OF CHINA

With the end of the Qing dynasty, China transitioned from a feudal country to a capitalist country. The provisional government of the Republic of China was set up in 1912. During this time, the provisional government treated education as an important evolutionary measure, and it developed the new Western-type schooling system at the same time as it gradually cancelled the traditional education mode. The reform of the political system inevitably promoted the reform of the educational organization and system: for example, the central education department was set up for the first time in 1912, the provincial education department in 1917, and the country education department in 1923. Complemented by the new education system, the new type of vocational education was also promoted to an extent. From 1905 to 1911, 237 industrial factories were established, and the demand for a related skilled workforce increased fast. Against this background, modern vocational education developed, and it became important in the whole education system.

The thinking of Dewey spread into China in the 1920s. His theory was prepared for vocational education; however, the teaching methods and purposes were in large part suitable for the reform of vocational education. The Dewey teaching method was learning by doing, while the traditional teaching methods were infusion and mechanical training. In Dewey's view, learning was treated as experience, which was an active-passive process. This means that experience was not initially cognitive, and education was an interactive process between educators and recognized objects [52]. Thus the new industries no longer required traditional and fixed skills and experience: they included more logical content than before, and educated more creative talent. Dewey believed that vocational education should be transitioned into general schools, the teaching purpose being continuing education. The education itself had no purpose: the purpose derived from the subjects who implemented education—the government, the schools, the teachers and so on. Nevertheless, Dewey thought that the education method had three main justifications:

- based on the requirements and inherent activity of personnel;
- it should be a feasible method and involve common activity on the part of students;
- and it prevented the purposes of normal education, which trained students as fixed products, and improved the creativity of students [52].

Under the influence of these theories, vocational education was not only a method of job training, but also paid attention to the self-development of students themselves. At that time, some Chinese educators were affected by Dewey's thoughts, the most famous being Huang Yanpei. He applied and combined Dewey's theories in China, and saw the vocational education system as the most beneficial system to solve the problem of the shortage of skilled talent. Huang Yanpei and many other educators created the National Association of Vocational Education of China (NAVEC, 1917) for the development of vocational education. At first, those students who could not study for a long time were viewed as the target group for vocational training. Most of them belonged to the civilian class, and though they may be excellent people, they were limited by their social environment and social class, so they had no

right or opportunity to receive education [178]. In that period, about 90 per cent of the population were working people who were at the bottom of society and had the most difficult lives. Yanpei believed, based on the educational purposes, that vocational education should be focused on the most working civic class—those people who had a direct link between livelihood problems and vocational education; thus vocational education was treated as public education at that time [178]. The point of his idea was to make a connection between education and living, seeking to make vocation education useful for both the students themselves and society as a whole. He treated “respect for jobs” as the most important point of vocational education. Later, his educational aim became to make the unemployed employed and to make the employed happy. This idea emphasized not only personal development but the development of society. It focused not only on skills training but also on ethics training. It paid attention not just to one skill but to comprehensive development.

There were three steps in total in the development of vocational education in this period. The first step was the period of the creation and innovation of industrial education (1912-1921). From fig.2.6, the education system included three main parts: general education, industrial education and normal education. In industrial schools, it included agriculture-, industry- and commerce-related majors. Industrial education developed better than before during these ten years. However, Yanpei and other educators considered that there was a big gap between industrial education and practical production, which meant that industrial education could not meet the needs of the social division of labour at that time. Thus, it could not solve the problem of the shortage of technical personnel in the labour market. Under Yanpei’s vigorous promotion and publicity, vocational education was very popular and he replaced industrial education with vocational education. He thought that before promoting vocational education, the first important task was to establish the vocational education system [100]. This period also saw the first use of the term ‘vocational education’, and industrial education was gradually replaced [165].

The second step was the period of the creation and innovation of vocational education (1922-1926). In 1922, a new school system was established and it represents the beginning of the modern Chinese education system. Since then vocational education has totally replaced industrial education. The new system divided schools into three kinds: general education schools, normal education schools and vocational education schools. It also adjusted schooling time: primary school was for six years, middle school for three years, high school for three years and university for four years, this innovation being based on the American schooling experience [191]. The main basis for this division was the period of physical and mental development of children: children around the ages of 6 to 12 were suitable for primary education; 12–18 was the youth period, suitable for middle and high school; and 18–22 was the adult period, suitable for higher education. What’s more, the new education system established a complete vocational education system. All industrial schools transitioned into vocational schools. In the primary education period, schools added some prepared vocational education courses, and in middle education period there were all kinds of majors, including agricultural, industrial, commercial and normal education. In the higher educa-

tion period, depending on the different situation in different areas, specific vocational higher schools were established. During this period, the association NAVEC promoted and spread vocational education in China. It surveyed vocational schools' basic situation and information on graduates, and it conducted field investigations and related data analysis. Since then, research on vocational education has transitioned from practical experience into theoretical analysis. In addition, the NAVEC created vocational schools at the same time, the first being Zhonghua vocational school((1918, in Shanghai)). The aim of this school was workers in various majors would be able to live based on their learning skills. In the first period, all majors were set according to social investigations—for example, the most scarce labour in the market was the blacksmith, and next was the carpenter. As a result, the main majors in this school were training blacksmith and carpenters, with other occupational training. Since then, it has added adult vocational education and training.

The third step was the period of the development of vocational education and training (1927-1949). The 1922 education system was used until 1949, and during this period the government promoted laws to improve the development of vocational education. The most famous was the law of vocational schools. Vocational education was divided into the primary vocational school, which recruited graduates (12-18) from primary school, and the high vocational school, which recruited graduates (15-22) from middle school. At the same time, in both types of school, there were tutoring classes for adult students, and there were no fees in vocational schools. Later when the Second World War happened, the formal education system broke down and vocational education transitioned into an informal and short-term mode.

In general, this was the first time a modern vocational education system had been established in China, and the education system was almost entirely based on other countries' experience. New political innovation brought education innovation. The transition was very difficult: in China, there were thousands of years' history of the advantage of academic education. The first time vocational education was brought up, it was unpopular was named 'education for living', even though at this time the traditional education mode had been destroyed. The thought of vocational education as a second-level education has lasted until today. However, as a new model of education at that time, a lot of educators tried to find a suitable way to develop the Chinese special vocational education system, and Huang Yanpei created the association NAVEC and the Zhonghua vocational school, which has continued to develop until today.

During the end of the nineteenth and the beginning of the twentieth century, great changes took place in the Chinese political situation. Political scientists and government officials tried to build factories and Western schools and learn languages and skills from other countries. Those schools were decentralized and fragmented, while they could be seen as a sign that traditional education methods had changed. Later, with the establishment of new state power, a whole education system was established to replace the traditional education system. In particular, the expansion of vocational education represented the transformation from elite edu-

cation to mass education in China [165], vocational education supported solving the problem of poverty and unemployment among ordinary people.

The policy in this period provided a good environment for the development of vocational education; the system gradually improved and many formal vocational schools were built to replace the informal training methods. However, as a foreign education mode, it was not as popular as expected. When this new Western education model was introduced in China, it brought some new thinking, new concepts and new ideas which were different from the traditional culture. The reformers expected vocational education to cultivate the human resources needed in the labour market and protect the country from other countries' aggression [42]. On the one hand, considering the educators' expectations, vocational education was not successful and was not really suited to the Chinese condition [42]; on the other hand, it provided a platform for normal citizens to transition to a higher social class [42], and education has since transitioned from elite education to mass education.

2.4 THE VOCATIONAL EDUCATION AND TRAINING IN MODERN CHINA

2.4.1 THE MODERN VET SYSTEM IN DISCOVERY PERIOD

The new regime was established in 1949, when China began to learn from the Soviet Union and developed an independent industrial system [203]. To quickly make up for the shortage of talent in the industrial system, the government paid attention to secondary vocational education, which had a shorter cycle and more practicality. Some central departments, including industry, transportation, agriculture and forestry, finance and trade, built related secondary vocational schools to cultivate skilled leaders and management leaders. At the same time, companies which belonged to the labour department built some vocational schools to cultivate front-line skilled workers. The development of industry increased at a high speed, and the number of workers training could not catch the demand for talent in the system. In 1958, a new education model which was suitable for the situation at that time was developed: the part-time vocational school. In this school, students would work half a day in factories and study for the other half in vocational schools. This was the beginning of the combination of vocational schools and the workplace. In 1965, the number of students was 1.26 million (53.2% of the number of students in all high schools). During the cultural revolution [21], vocational education was treated as a capital education mode and, as a result, most secondary vocational schools were suspended or transitioned into general middle schools.

After the Third Plenary Session of the 11th Central Committee of the Communist Party of China [22], the government has began to promote the policy of "Chinese economic reform" [23]. China put development of the economy first, and in the coming 20 years the whole country developed rapidly based on labour-intensive industries. From 1979 to 1997, the average annual GDP growth was 9.8%. The development of industries and the economy was inseparable from support for related skilled talent, and vocational education was promoted continuously during this period: some general high schools were even transitioned into vocational schools. The government planned to allocate jobs for graduates from the vocational schools: they had better employment quality and higher employment expectations, representing a higher social status. Most individuals preferred to go to work directly after graduating from vocational

²¹The Cultural Revolution, formally the Great Proletarian Cultural Revolution, was a sociopolitical movement in China from 1966 until 1976. Launched by Mao Zedong, the Chairman of the Communist Party of China (CPC), its stated goal was to preserve Chinese Communism by purging remnants of capitalist and traditional elements from Chinese society and to re-impose Mao Zedong Thought (known outside China as Maoism) as the dominant ideology in the CPC. Source: Wikipedia

²²The 3rd Plenary Session of the 11th Central Committee of the Communist Party of China was a pivotal meeting of the Central Committee of the Communist Party of China held in Beijing, China, from December 18 to December 22, 1978. The conference marked the beginning of the "Reform and Opening Up" policy and is widely seen as the moment when Deng Xiaoping became a paramount leader of China replacing Chairman Hua Guofeng, who remained nominal Chairman of the Communist Party of China until 1981. The meeting was a decisive turning point in post-1949 Chinese history, marking the beginning of the wholesale repudiation of Chairman Mao's "Cultural Revolution" policies, and set China on the course for nationwide economic reforms. Source: Wikipedia.

²³The Chinese economic reform refers to the program of economic reforms termed "Socialism with Chinese characteristics" and "socialist market economy" in the People's Republic of China (PRC). Source: Wikipedia.

schools rather than go to university. Before 1993, the rate of graduates going to universities was less than 28.7%, in 1996, vocational education in China developed to a peak where 58% of students chose vocational schools, higher than the number in high schools.

With the process of the social division of labour, the demand for extensively skilled workers decreased gradually, and the scale of secondary vocational education shrank. The rate of enrolment of students in secondary vocational schools decreased from 58% in 1996 to 38% in 2002. Instead, the scale of higher education continued to grow. However, the expansion of higher education brought about the popularization of higher education [133], and demand for certain high-level skilled talents increased. Since 2005, the government has again encouraged the development of higher vocational education.

2.4.2 THE CHANGES OF VOCATIONAL EDUCATION AND TRAINING IN RECENT YEARS

Vocational education was thus promoted by the development of industries. In ancient China, the main economic body was agriculture, alongside the handicraft industry, and skills training mainly occurred in the form of an apprenticeship in those industries. In the transition period, the Chinese economic system was influenced by the world economy. Modern industries were introduced into Chinese markets, and at the same time the modern vocational education mode was developed in China to cultivate the talent to work in the new industry. In modern China, vocational education has also been developed with the demand from industries. It can be seen from fig 2.7 about changes in employment positions' proportions in different industries in China from 1952 to 2018²⁴.

There is an obvious turning point in 1958 in the fig 2.7 that is beginning of the Great Leap Forward The Great Leap Forward (Second Five Year Plan) of the People's Republic of China (PRC) was an economic and social campaign led by the Chinese Communist Party (CCP) from 1958 to 1962. Source: Wikipedia.. 1949-1952 was the First Five Year Plan period and it was also the national economic recovery period especially the gross industrial production has been increased from 14 billion to 34.3 billion. The proportion of employment positions in the second industry has been increased from 7.4% to 10.7% and the proportion of the second industry in the whole industry system has been increased from 43.1% to 56.7% from 1952 to 1957. Since 1958 the Second Five Year Plan has been promoted and the growth of the gross industrial production has been added 1.1 times in the next 3 years until 1960 and then has been

²⁴The data have been collected from "Chinese Statistical Yearbook" and "Chinese Labor Statistical Yearbook" and the collectable data has been found from the database since 1952.

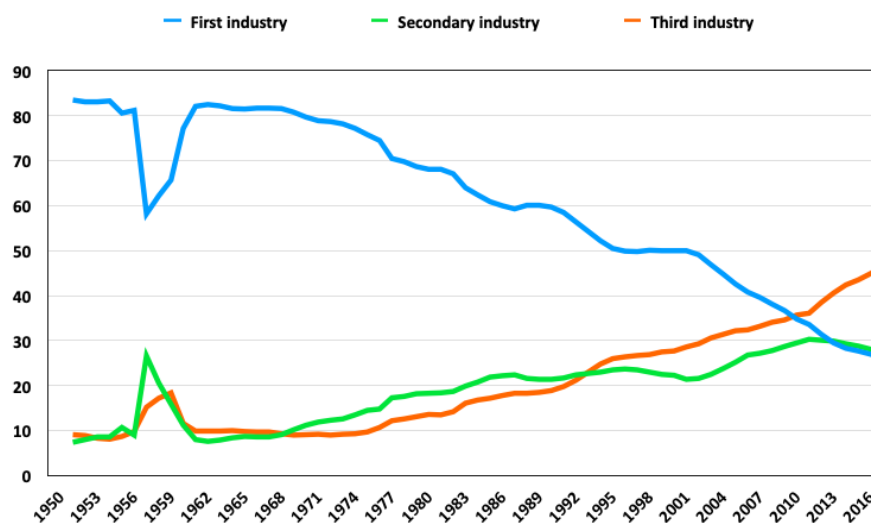


Figure 2.7: The proportion of employment positions in different industries in China from 1952 to 2018 (%)

dropped rapidly, in 1961 it has been decreased 39% and in 1962 it has been decreased 13.3% again. It also has been explained the turning point in the green line that the employment positions in the second industry has also been dropped from 26.6% to 8.0% from 1958 to 1962. Combination with the previous section, this period was also the development of secondary vocational schools and in 1958 to catch up the development of the secondary industry the part-time vocational schools have been set up in the industrial factories. From 1966 to 1978, it was the Cultural Revolution period and the development of industries has not an obvious change and it was a relatively stable period. Since 1978, the second and third industries has been evolved in high speed and the employment positions in the second and third industries has been added respectively from 17.3% to 27.6% and from 12.2% to 46.3% (1978-2018).

The development of the economy has changed the demand for the labour force in the market and as a result, the training method for skilled talents has also been influenced. Let us see the basic changes of secondary vocational schools in China from 1950 to 2018 in the following fig 2.8. The historical process also has a reflection on the development of vocational education in China, the data from the Chinese Education Yearbooks before 1970 is not completed while it still has an interesting point. In 1965 the number of secondary vocational schools has dramatically increased 61,216, more than 10 times in 1962 when the number was only 5,229. The secondary vocational education was treated as the most suitable education method to cultivate skilled talents under the background of the Second Five Year Plan. And later during the Cultural Revolution period from 1966 to 1976, the secondary vocational schools have been destroyed too much and we can see another top point in fig 2.8 in 1976. At the end of 1976, the number of general high schools has reached to the top and it was more than 60,000. Before 1978 no matter vocational education or general education they have been both been exceeding developed in some stages.

From 1978 to 2000, the secondary vocational education has a significant process and the

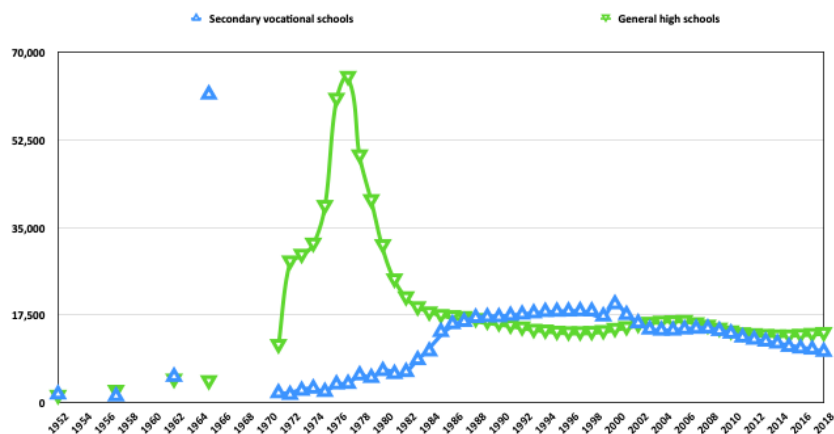


Figure 2.8: The number of schools in secondary education level in China from 1950 to 2018

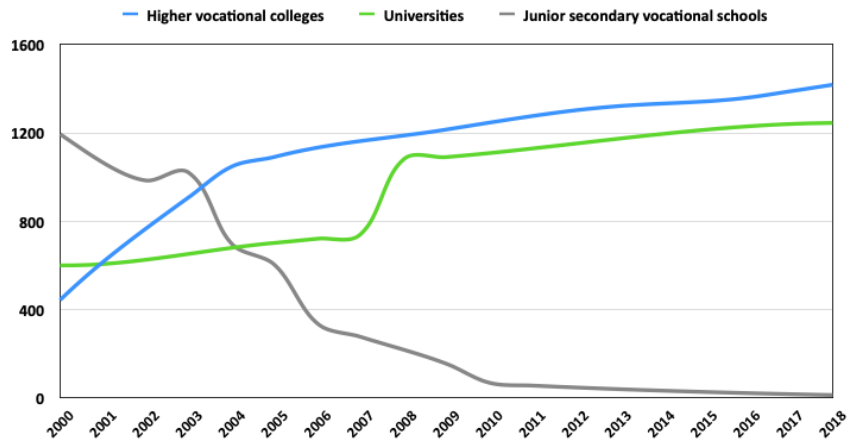


Figure 2.9: The number of other level vocational schools in China from 2000 to 2018

number of vocational schools even more than high schools. After 2000, the secondary vocational education has lost its appeal and the number of schools has been decreasing until now. Their political reason might be explained to this unstable situation. The establishment of a new regime may lead to social instability and policy orientation has a direct impact on the development of education. Thus it is possible to have diametrically opposed attitude on vocational schools and high schools in short decades. Except for secondary vocational schools, there are also junior secondary schools and higher vocational colleges in the modern Chinese education system. Since 2000, the graduates from higher vocational colleges have been allowed to study in normal universities through upgraded from unified recruitment. It seems to treat higher vocational colleges lower than universities and before 2000, even all data about universities has no categories they were just different types in the higher education system. Here the fig 2.9 describes the changes in junior secondary vocational schools and higher vocational colleges in the past 20 years. The junior secondary vocational schools seemed to be almost disappeared because of the nine-year compulsory education policy, and the target is mainly providing education for all age-appropriate students. And the higher vocational colleges even have a large proportion of the higher education system. Especially in 2019, 2020 two years, the government has policies about recruiting more students in vocational colleges.

2.5 CONCLUSION

This chapter introduces different VET models under Chinese historical background, see from fig 2.10. It is not difficult to find that the model of VET has been developed with the development of the social process. From feudal society to pre-modern society in China, the traditional apprenticeship has been replaced by the modern vocational school to transfer skills training. Modern industries development changed and increased the demand for the skilled labour force in the market, the apprenticeship in the handicraft industry could not meet this requirement any more. What's more, education rights have been always controlled by the government in China. Even though the private apprenticeship has also existed, it was not the main-stream education model. During the Chinese history periods, vocational education has not been promoted more than academic education. The attractiveness of VET is not enough could also be treated a history problem. The function of VET to promote the development of the youth population has been mentioned until the pre-modern period, one reason may because the Chinese education thoughts have been influenced by other countries since then.

	-1840s	1840s-1950s	1950s-
Mode	The ancient apprenticeship system	The original of modern vocational school	The modern VET system
Fields	Handicraft industry (Official + Private)	Handicraft industry + modern industries	Handicraft industry + modern industries + service industries
Relationship	Mentorship	Teacher-student	Teacher-student
Training place	Official + family workshop	Vocational school	Vocational school
Evaluation standard	Government recognition + master recognition	Graduate certificate	Graduate certificate + vocational qualification certificate
Economic function	Demand of service for royal + maintain local economic stable	Demand of workforce in the new industries	Demand of workforce in the new industries
Social function	Mobility for class + inheritance of skills	Youth social integration + inheritance of traditional skills	Youth social integration + inheritance of traditional skills

Figure 2.10: The characterises of VET in different periods in China

The above sections describe the development of the Chinese vocational education system. In modern society, vocational education's lower attractiveness than general education is a hot topic. Vocational education has not always been popular, but recently, not every level of vocational education has been unwelcome. Based on data in the past 20 years, only secondary vocational education has developed lower attractiveness.

VET is a modern concept which was introduced in China at the end of the nineteenth century. In ancient China, vocational education originated from the inheritance of family skills, and before the Qin dynasty there were already official and private schools to transfer skills in

the agriculture and handicraft industries. Later, through the feudal society, dynasties established an official apprenticeship system from central to local government, and constructed a teaching model combining production, education and research. They organized, collected and improved various vocational skills, compiled vocational training materials, formulated vocational-technical standards and disseminated them widely. This played an important role in promoting the process of science and technology, economic development and cultural innovation in ancient China. In the process of development of ancient vocational education, successive governments played an important role, actively guiding, participating in and encouraging the running of schools, and exploring multiple ways to raise funding. These measures raised the level of vocational education and promoted its standardized development. In addition, the traditional culture that officialdom is the natural outlet for good scholars influenced vocational education. Education in the ancient period, whether academic or vocational, belonged to the elite class, and those with skills and talents had the opportunity to become an official. Compared with the situation in modern China, one prerequisite was that individuals should graduate from universities, not from vocational schools. Considering the rarity of ancient vocational education, it was no less attractive than general education.

The modern Chinese VET system came from Western countries. At the end of the nineteenth and the beginning of the twentieth century, China was in a transition period, when the feudal society had ended and a new capitalist country was developing. Several vocational schools were established, followed by the establishment of a complete education system which combined vocational education and academic education. During this period, vocational education was influenced mainly by America. For example, American educator Paul Monroe (1886-1947) contributed much to educational interaction between China and the United States and promoted the formation of the modern education system in China. Furthermore, Chinese vocational educator Huang Yanpei was influenced by another American educator, John Dewey (1859-1952), to promote practical education. The traditional education system was replaced and vocational education was no longer a way for the government to select officials. On the contrary, it became a way to help ordinary people make a living and became more popular than academic education. From the economic aspect, the thousand-year-old traditional small-peasant economic system was destroyed, replaced by the capitalist mode of production. The establishment of new types of factory changed the demand for skilled workers, and the educational system for those workers was naturally upgraded. In general, vocational education in this period provided the relevant labour force to meet the requirement of the economic development, at the same time providing the chance for ordinary people to achieve class mobility. Deeply influenced by the traditional culture, to be an officer was the best outlet for most Chinese people; thus vocational education to make a living became a second-level education.

With the foundation of the People's Republic of China, the education system inherited the previous system and made some adjustments. Vocational education developed in waves: sometimes it developed vigorously—for example, in 1965, more than 60,000 secondary vocational schools were set up—and sometimes it was restricted. Political and economic develop-

ment always had a direct impact on vocational education, and the social influence was sometimes invisible and indirect. In modern China, it is essential to develop vocational education to meet the development of new industry, like the manufacturing industry. In the education system as a whole, vocational education has been treated as lower education: most students, if they could choose general education, would not choose vocational education. The proportion of students in secondary vocational education has been lower than in general education for the past several decades, while, for higher vocational education, the proportion is higher than in universities: the evaluation standard is the college entrance exam score, where most students with higher scores prefer to choose to study in universities.

Further possible factors which might influence students' choice to study in secondary vocational schools will be discussed in Chapter 4. For two main reasons, data for the past 20 years will be analysed: firstly, it is difficult to collect enough public data, and restricting the data to the last 20 years enables the collection of as many different factors as possible; secondly, since 1997, secondary vocational education has become less attractive than general education. Historical research can help us understand the development process of Chinese vocational education and the political, economic and cultural influences behind it, while contemporary data analysis can make the research more rational.

3 THE ORIGINAL, DEVELOPMENT AND CURRENT SITUATION OF THE VOCATIONAL EDUCATION AND TRAINING IN GERMANY

3.1 INTRODUCTION

In line with the previous chapter, this chapter will examine the historical process and current situation of the German vocational education system. This chapter is divided into four periods: the 1870s, the 1870s–1920s, the 1920s–1970s, and the 1970s onwards. The vocational education model in the different periods has different characteristics and this chapter will explore the factors which may have affected changes in vocational education in Germany.

The traditional vocational education model in the Middle Ages was the traditional apprenticeship, originating from the training of master craftsmen developed by the medieval guilds [117]. Influenced by the Industrial Revolution, apprenticeship in the handicraft industry was destroyed and vocational schools were built instead. Later in the twentieth century, the well-known dual vocational education system was built in Germany, which has continued to function ever since. Recently, there has been a gradual decline in the population of Germany; along with the ageing problem, there is therefore an urgent need for highly skilled personnel. Fewer students come from vocational schools, while students' desire for higher education has increased. The VET system in Germany has cultivated the skilled talent to meet the development of society, and the dual system is seen as a successful model which can be applied to other countries. However, Germany has a traditional cultural background of training workers in the workplace, and the system has been developed and influenced by many factors. Every innovation in vocational education has been underpinned by political, economic, sociological or cultural factors. The main aim of this chapter is to analyse the factors influencing the formation of the vocational education model from a historical perspective. The main research methods in this chapter are the historical and logical methods, as introduced in the previous chapter, and the comparison method, which will compare different characteristics of vocational education in different periods.

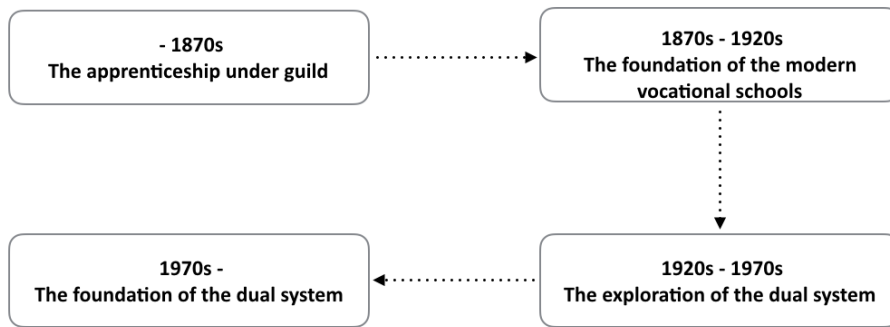


Figure 3.1: The research structure in chapter 3

The research structure in this chapter is showed from fig 3.1. It has four main periods, the middle ages before the 1870s, the industrial revolution period from 1870s-1920s and modern society periods 1920s-1970s and 1970s-now. Corresponding to each period, the characteristics of vocational education are apprenticeship under guild, the original of modern vocational school and the explore period of the dual system and the application period of the dual system.

In every period, the features and the influential indicators of vocational education will be described. Finally, a short comparison and conclusion will be added to show how the historical and cultural indicators affected the development of vocational education in Germany. Some researchers believe that the modern vocational education model is a product of the Industrial Revolution [39], because the new technologies brought new production methods which changed the demand for labour force. This could be one factor, and the following content will discover more related factors.

3.2 THE APPRENTICESHIP IN THE MIDDLE AGES BEFORE 1870S

Apprenticeship was considered to be the earliest form of vocational education [166]: as a systematic and institutionalized education model, it originated from the Middle Ages in Europe. In the medieval period, the land comprising modern Germany was ruled by the Holy Roman Empire²⁵

Here will introduce the apprenticeship system not only existed in German but also existed in main Western Europe and it developed with the development of guilds in the Middle Ages. The apprenticeship system not only existed in Germany, but also in Western Europe as a whole, and it developed with the guilds in the Middle Ages. In the ninth century, the seignorial economy²⁶ was popular in Western Europe. Productivity was developed at this time, and the increase in surplus products promoted the development of an urban handicrafts industry [111].

The family workshop was the main method of handicraft production. At the end of the Middle Ages, people moved to live in towns and cities; some merchants engaged in retail, wholesale and trade with other cities and countries, and some craftsmen engaged in handicraft production, providing products and services. The guilds were built against this social background.

Merchants built trade unions to protect their interests, and many characteristics of merchants' guilds were later [111] copied by handicraft guilds to control the quality of production, reduce competition and provide comprehensive training for apprentices in the guild. Fig.3.2 shows the functions of apprenticeship under a guild.

²⁵The Holy Roman Empire, often unofficially referred to as the Holy Roman Empire of the German Nation, was a multi-ethnic complex of territories in Western and Central Europe that developed during the Early Middle Ages and continued until its dissolution in 1806 during the Napoleonic Wars. Source: Wikipedia.

²⁶Manorialism or seignorial was an organizing principle of rural economies which vested legal and economic power in a lord of the manor. Source: Wikipedia.

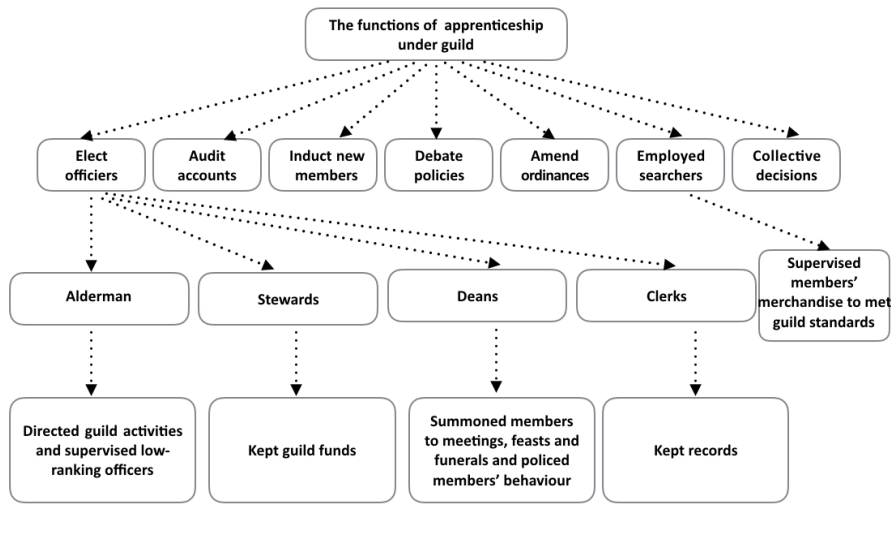


Figure 3.2: The function of apprenticeship under guild

The guilds here can be seen as closed organizations with feudal privileges: externally they had a monopoly on employment, and internally they had mandatory management and supervision of the entire industry. Apprenticeship was also adopted under their control.

In the guilds, there were three levels of practitioners masters, journeymen and apprentices. Fig. 3.3 shows that those three practitioners have a strict hierarchy: the masters had the right to recruit apprentices and taught them skills and ethics; at the same time, apprentices had to live with their masters and worked for them. When apprentices finished their study, the masters could apply to the guild for a final assessment. When they passed the assessment, the apprentices could become journeymen. Journeymen would still work for masters until they finished their own masterpiece; then they applied for another assessment of this masterpiece: when they passed, they could become masters. Masters were always independent craftsmen and could own their workshops; at the same time, they were the members of a guild. Of course, when they became masters, they could begin to recruit their own apprentices.

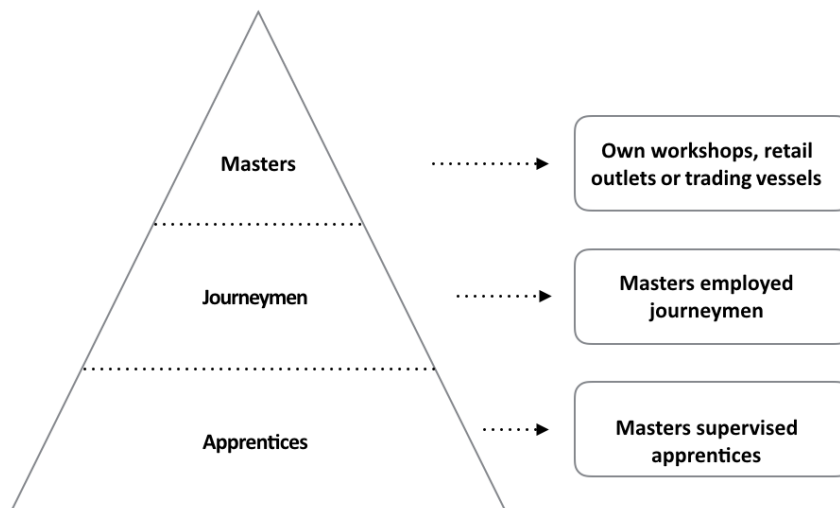


Figure 3.3: The three levels of practitioners in the guilds

Generally, the guilds' management of apprenticeship is shown in the following aspects.

- The guilds would provide written contracts between the masters and their apprentices [61], limit the number of apprentices per master [89], regulate the apprentices' study period, and so on. In continental Europe, the apprenticeship period was generally 3-4 years [46], the duration of contracts mainly depended on the complexity of different trades and the age at which apprentices started their study [43].
- In terms of the teaching tools and teaching content, the masters would receive their main guidance from the guilds [43]. Even though there was a big difference among different occupations, the main teaching methods were similar, and they were imitation and learning by doing. [43].
- Assessment was also controlled by the guilds. The apprentices' outcomes were tested by the guilds, and the journeymen's outcomes were tested by the masters and guilds together [61]. Both apprentices and journeymen had to prove their skills by examination or making a masterpiece [29].

Epstein explained from the perspective of standard economic theory that most resource-poor but potentially skilled workers would not be able to bear the investment in their skills training, because future human capital could not act as collateral, leading to a shortage of skilled workers in the labour market [61]. The apprenticeship allowed trainees to convert training subsidies to below-market wages after training. If the apprentices were to quit before the contract expired, the masters would not recover the cost of their training [61]. To improve the feasibility of apprenticeship, it was necessary to ensure the master's investment in the training through a mandatory contract. Therefore, the existence of the guild guaranteed the smooth operation of the apprenticeship in this period. There are other reasons that

apprenticeship was successful under the control of the guilds in the Middle Ages.

- Before the Industrial Revolution, the main production method was the small family workshop: at this time, the relationship between masters and apprentices was not an employment relationship. The basic interests of the masters and apprentices were compatible: what the trainees earned belonged to the masters, and the masters helped the trainees to learn skills well. The apprentices hoped to become masters in the end through hard study.
- The guild formulated various rules for an apprenticeship so that the whole system could run well. The direct guidance and supervision by the guilds also ensured the quality of skills training and production. The number of masters and apprentices in each industry could also be balanced, and there would be no abuse of apprenticeship.

In conclusion, there are some basic characteristics of apprenticeship under guilds in this period. Firstly, the apprenticeship was controlled by the guilds in all aspects, which represents the nature of apprenticeship transitioning into a public relationship. Secondly, the guilds controlled various aspects of apprenticeship, such as the selection of apprentices, the assessment of masters, the contracts between masters and trainees, the teaching content and so on, which means that the apprenticeship gradually became a relatively complete system. Thirdly, the teaching method in this period mainly depended on imitation and was in line with the production process. Fourthly, the relationship between masters and apprentices was close, though later it has gradually changed to an employment relationship because of the written contracts.

Economic development was the main reason why apprenticeship developed well in this period. With the development of productivity, urban handicraft also developed very well. People began to flood into cities or towns to make a living. The establishment of guilds and the management of apprenticeship ensured the balance of the labour force in the labour market. The limited entrance in every industry reduced unhealthy competition between masters. In addition, the guilds played an important political role. Earlier, craftsmen existed in feudal estates and monasteries [110], and with the development of urbanization, the demand for craftsmen has increased. The European population also increased during this period, and those earlier artisans started to move towards towns, where they settled for a long time before they could become free citizens [111]. At this time, those craftsmen who were certified by the guilds were eligible to become urban free citizens. Against this background, apprenticeship was a good opportunity for ordinary people, especially farmers who worked for the manors, to change their status. Alfred.K said that essentially the guilds were religious brotherhoods [111], because the oldest literature on the guilds almost exclusively dealt with religion [213]. At first, all the rules established by the guild were based on religious norms; however, later, also led by the guilds, the population overthrew the control of churches. [111].

In the medieval period, technology in all walks of life was inherited and spread because of apprenticeship under guilds. Apprenticeship itself also developed to form a relatively

complete system. However, there were also some disadvantages, the first being that even though the technology spread, it was not well reformed and innovated very well. Actually, skills transfer could only be successful through human mobility [11], while one function of the guilds was to block human fluidity. In other words, the guilds themselves did not oppose technological innovation, but the existence of the guilds hindered technological innovation to a certain extent. The reaction of individual artisans to technological innovation depended mainly on politics rather than markets [11]. Poorer craftsmen had a lower capital investment and mainly made a living depending on their skills; thus they normally opposed capital-intensive and labour-saving innovations, while the richer craftsmen were less threatened [11]. When labour-saving innovations coincided with a serious economic downturn, the councils seemed to address small masters' concerns to ensure social and political stability and to restrain unemployed craftsmen from leaving the town [11]. The other shortcoming here was the gender issue in apprenticeship. According to many documents during this period, most guilds only accepted male apprentices. The gender division of productive labour was clear, and medieval women tended to juggle many occupations, being especially prominent in poorly remunerated trades like minor food trades, spinning or small-scale marketing [16]. They were more often carriers of wealth to husbands or children, and they normally had less wealth or less income than their work deserved [16].

Apprenticeship in the medieval period was therefore controlled by the guilds and influenced by political, economic, cultural, population, gender and other factors. The main aim of apprenticeship was to protect the interest of the guilds. Through apprenticeship, the guilds could keep balance in their industry while the skills were passed on.

3.3 THE APPRENTICESHIP IN THE INDUSTRIAL REVOLUTION PERIOD 1870S-1920S

3.3.1 THE DECLINE OF APPRENTICESHIP UNDER GUILDS

Apprenticeship declined with the decline of the guilds. At the end of the fifteenth century, an increasing number of individuals having joined the guilds, there were more and more guilds and it became more difficult to manage the whole system. Therefore, the guilds adjusted the membership standard to limit the numbers, because to enter an industry, the craftsmen needed permission from the guilds. The guilds were seen to have advantages for development of the economy in the medieval period, except for their exclusive and rent-seeking cartels [45]. The guilds limited the group of employers who could use skilled labour and encouraged the masters to invest in training, promoting the formation of human capital [60]. At the same time, they established the products' standards and guaranteed the products' quality to ensure that masters could respond to the price competition [45]. However, in the late Middle Ages, the guilds hindered the renewal and advancement of technology to some extent. Compared with the increasingly flexible labour market, guilds tended to decline, the main reason being that changes in the demographic and the labour market effectively removed the guilds' barriers to labour market entry [45]. Against this background, more craftsmen and enterprises chose to avoid the regulations of the guild on workshop size and apprenticeship terms, and there were conflicts with the functions of guilds, which encouraged investment in human capital and production innovation [45]. There were more and more questions about the guilds being apparently superfluous.

The handicraft industry in Europe, with the family workshop as the main production method, peaked in the fourteenth and fifteenth centuries. At the end of the fifteenth century, a new route to India from Europe and the American continent was discovered. With the initial accumulation of capital due to trade expansion in most European countries, the main production methods shifted from family workshops to handicraft workshops, which were based on manual labour and the division of labour [83]. The emergence of handicraft workshops marked the development of capitalism and the sixteenth–eighteenth centuries were a transitional period of European development from a feudal society to a capitalist society. Apprenticeship was influenced by transition in two ways: firstly, the relationship between masters and apprentices changed into an employment relationship, and more apprentices were recruited and worked as cheap labour for masters; secondly, the education function in apprenticeship was weakened because the masters no longer paid attention to the production process, and the division of labour meant the apprentices could not be guided completely. After the sixteenth century, the trade route in Europe shifted to the Atlantic: industry and commerce were affected, and the guilds also received a shock.

In the eighteenth century, local government began to manage apprenticeships. In 1733, the Prussia government enacted relevant laws to ensure that apprenticeship could continue to operate: for example, every master could only recruit two journeymen and one apprentice at a time; masters should take responsibility for apprentices' skills training; supervision of

apprenticeship no longer belonged to guilds but rather to the local government, and so on. Those laws were subsequently implemented throughout Prussia.

In the nineteenth century, the traditional guilds system was in conflict with the development of productive forces and it stopped the normal market competition. The government was indecisive between encouraging free trade and protecting national handicrafts. In 1810, the Stein-Hardenbergschen reform introduced free trade (Gewerbefreiheit) into Prussia: from an economic perspective, it represented free competition and as much free market access as possible. In 1869, the government also promoted the Trade and Industry Code of 1869 and cancelled the certification of qualifications for apprentices. It deleted the apprenticeship contracts on the official apprentice roll and failed to enforce written apprenticeship contracts. Apprenticeship under guilds seemed to be destroyed here, and later came the Gründerjahre (the founding years), the years when the Second Reich was established, circa 1871–1873. After Gründerjahre came the Great Depression in Germany, and this period was a major turning point in the structure and history of economic growth in Germany, sowing the seeds for major social and political upheaval [80].

3.3.2 THE SHIFTS ON APPRENTICESHIP UNDER THE FIRST INDUSTRIAL REVOLUTION

The first Industrial Revolution happened during the 1760s–1840s, the starting event being marked as the invention of the steam machine in England. During this period, old production methods were gradually replaced by machines and manual workshops were gradually replaced by large-scale factories. This happened first in England and later spread to the whole of Europe. From fig. 3.4²⁷ industrialization reform began in the German area around 1860–1870.

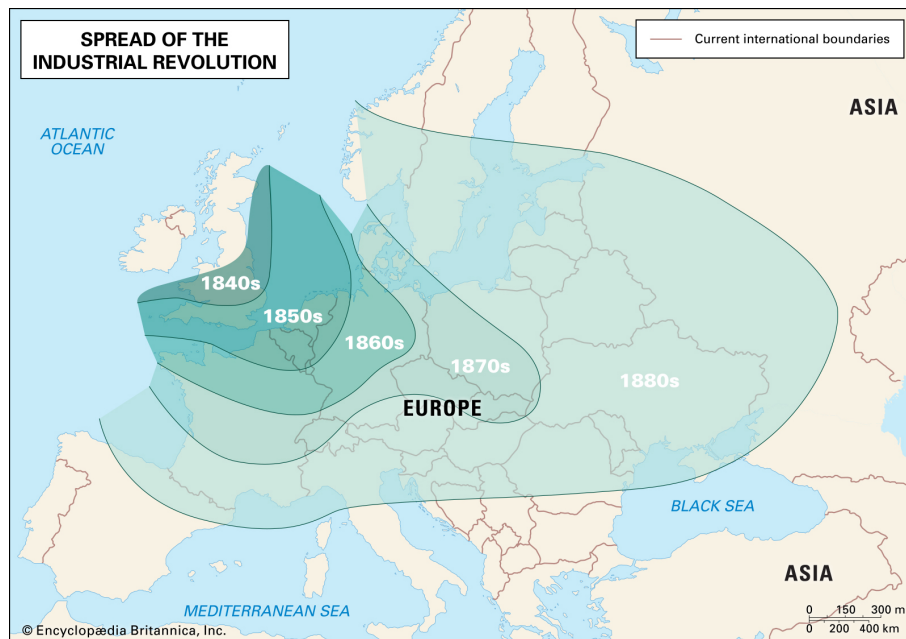


Figure 3.4: The map about the spread of the industrial revolution in Europe.

Even though it did not begin as early in Germany as in other European countries, the speed of development was faster. The first industrial industry in Germany was the textile industry, promoted by the elimination of tariff barriers through Zollverein²⁸ in 1834. Later, the take-off stage of economic development came with the railway revolution in the 1840s, which opened up new markets for local products; created a pool of middle managers; increased the demand for engineers, architects and skilled machinists; and stimulated investments in coal and iron [33]. The apprenticeship had a new life during this time. It was no longer simply a training policy, but was a middle-class production policy [80]. The law on the Freedom of Industrial Activities in 1869 established a free trade system at the same time as it kept the apprenticeship [137]. A series of laws were set up during 1878–1897 to regulate the apprenticeship. The Handicraft Trade Protection Act (Handwerkerschutzgesetz) 1897 has been seen

²⁷Source: <https://www.britannica.com/event/Industrial-Revolution>

²⁸The Zollverein, or German Customs Union, was a coalition of German states formed to manage tariffs and economic policies within their territories. Organized by the 1833 Zollverein treaties, it formally started on 1 January 1834. Source: Wikipedia.

as an oblique predecessor to the current Vocational Training Act [85]. Some regulations on apprentices from the medieval period were revived, even though the certification of masters was not a necessary condition for training. The newly established chambers and guilds had the following rights to involve apprenticeship activities systematically:

- the training craftsman should be at least 24 years old and should have finished their own apprenticeship and worked as an independent artisan for at least five years;
- and contracts between employers and apprentices should be submitted to the chambers or guilds, the contracts normally lasting three years. At the end of their study, the apprentices should have the opportunity to take an exam, which was held by the chambers or guild [85].

The Trade Act 1897 laid the foundation of the modern dual system framework [47].

The predecessor of vocational schools played a role in skills training during this period. The Industrial Code of the North German Confederation (1869) offered another regulation of apprentices and masters under the age of 18, who were obliged to continue to attend continuation school [77]: those schools developed from Sunday schools [68], being established by religions and later operating under cooperation between churches and some merchants to provide general knowledge and skills training for handicraft workshops. The continuation schools were divided into two types: the Church Sunday School provided courses on calculation, drawing, machinery, etc, while the Handicraft Sunday School provided supplementary courses on skills training in the handicraft industry.

Influenced by the first Industrial Revolution, production methods changed dramatically, and a lot of factories were established during this period. However, instead of the apprenticeship disappearing, it survived. To encourage free trade, the rights of guilds were reduced and they were only given the authority to regulate and monitor apprenticeships [77]. The foundation of the dual system framework was established at this time, and the continuation schools that provided skills training were defined.

3.3.3 THE SHIFTS ON APPRENTICESHIP UNDER THE SECOND INDUSTRIAL REVOLUTION

The second Industrial Revolution happened during 1870–1914, and it also spread from England to other European countries. The second Industrial Revolution was represented by the large-scale application of electricity and the invention of electric lamps. New technologies, especially electricity and internal combustion engines; new materials and substances, including alloys and chemicals; and communication technologies such as telegraph and radio became particularly important. There were huge innovations in the fields of chemistry, electrical appliances, oil production and the steel industry [172]. Factories concentrated production in a separate specific area and were guided by experts (instead of producing at home). The division of labour made technical and non-technical labour more productive and made the population of industrial centres grow rapidly [102].

During this period, the German Reich (Deutsches Reich²⁹) has developed into the main industrial country in Europe and invested more in scientific research, especially in chemistry, motors and the electricity industry. At the end of the nineteenth century in Germany, there were three great depressions: 1873–1878, 1882–1886 and 1890–1895. The depressions made the youth social problem more serious: the youth crime rate has increased from 30,662 to 53,329 in 1882–1913, and a large number of the young population attended the Ruhr Miners' Strike of 1889 [80]. To help low-class youths to integrate into society better, the government decided to broaden further training schools. Until the foundation of vocational schools, further training schools played an important role in youth welfare.

During this period, a famous German educator, Georg Kerschensteiner, promoted the concept of vocational education and the modernized VET system by making a connection between civic and liberal education, stating that vocational education could be seen as a medium for self-fulfilment [200]. Kerschensteiner believed that around the world, most of the population should work during their adult lives, or depend on their husbands working, because at that time the male labour force dominated the market. Kerschensteiner advocated setting up training schools based on specific industries and occupations to replace the further training schools [200], and set up workshops to engage interest and commitment from employers. In Kerschensteiner's view, apprentices being trained in the workplace was not enough to be a qualified citizen. The vocational schools also played an important role in providing theoretical courses like literacy, arithmetic, even sports, at the same time providing moral education. The vocational schools and the apprenticeship were complementary; as a result, they helped the German government to cultivate well-trained, well-educated industrial workers. Though Kerschensteiner's purpose was to promote civic education, vocational schools were properly founded in this period.

²⁹Deutsches Reich was the constitutional name in the German language for the German nation state that existed from 1871 to 1945. The Reich became understood as deriving its authority and sovereignty entirely from a continuing unitary German "national people", with that authority and sovereignty being exercised at any one time over a unitary German "state territory" with variable boundaries and extent. The German Empire of 1871–1918 is termed Deutsches Kaiserreich in standard works of reference. Source: Wikipedia.

Some scholars believe that vocational education in the modern sense was a product of industrialization [39]. The content below states some changes in German political, economic and social aspects during the period of the second Industrial Revolution and the related influences on the development of vocational education.

- In 1871, a united Germany was founded, which meant that commodities and natural resources could be distributed throughout Germany faster than before, and the costs and risks of owning a business decreased, because a united country was coordinated in its actions, making it less vulnerable to political and military attacks. A stable and united political environment was good for the development of business. The German government not only encouraged the development of new industries, but also protected the traditional handicraft industry and commerce industry.
- New technologies brought by the second Industrial Revolution stimulated the development of German labour-intensive industries, such as steel, coal, chemical and other industries. The establishment of a large number of factories led to a rapid increase in the demand for relevant skilled workers in the labour market. The apprenticeship model in the handicraft industry transitioned into those new industries to cultivate new skilled workers.
- Furthermore, economic development and the prosperity of the country attracted more immigrants, while the improvement in living standards allowed residents to have more children. As a result, during this period the demographic in Germany increased. More workers could be trained in the new industries, which made the industries more prosperous.
- Laws also promoted apprenticeship in this period. The 1869 Trade, Commerce and Industry Regulation Act of the North-German Confederation retained traditional apprenticeship to protect handicraft products, and the 1897 Handicraft Trade Protection Act (Handwerkerschutzgesetz) regulated the new rights of guilds in relation to apprenticeship.
- During this period, there have been several economic depressions in German society: to maintain the stability of the whole society and help low-class youths integrate into society, the German government advanced further training schools to provide general knowledge and skills training courses.
- Kerschensteiner believed that the function of traditional training schools could not sufficiently promote youths to be qualified citizens, and he set up a new form of vocational school to provide ethical education for the students who studied at the workplace. Although Kerschensteiner's goal was to promote civic education, the idea of combining workplace and vocational schools to cultivate future workers in different occupations had meaning for the reformers of vocational education in the future.

Overall, during this time, the training method was still apprenticeship, but it transitioned from the handicraft industry to the new factories. Further training schools also spread for

political reasons. Until then, the two elements of the dual system—training in the workplace and vocational schools—were independent.

3.4 THE DUAL VOCATIONAL EDUCATION SYSTEM IN MODERN SOCIETY

3.4.1 THE DISCOVERY PERIOD FOR THE FOUNDATION OF THE DUAL SYSTEM 1920S-1970S

The previous content introduces the two elements of the dual system. Training in workplaces and vocational schools was established at the beginning of the 1920s; however, they were not a system yet. How they cooperated was not clear: regulations in the new industries, like the setting of training standards, were based on the traditional apprenticeship from the hand-craft industry until the implementation of the Vocational Training Act of 1969, which represented the formal foundation of the dual system. This took almost 50 years, and it was influenced by the following factors.

Firstly it is the changes in the political area. During this 50 years, the German has transitioned from different regimes the German Empire (before 1918), Weimar Republic (1918-1933), National Socialism (1933-1945) and the Federal Republic of Germany/German Democratic Republic (1945-1990). And World War I (1914-1918) and World War II (1939-1945) have both happened in Germany. The attacks from police and military have led to an unhealthy environment for all aspects of social development.

At the beginning of the twentieth century, the steel, coal, chemical and other industries developed rapidly in Germany; the development of the railway meant higher demand for steel and iron, which further stimulated the development of the steel and coal industries. Germany was rich in natural resources at that time. For example, the Ruhr and Saarland areas were rich in coal and steel, and Silesia had a large amount of sodium and potassium, which developed a large chemistry industry. Germany changed from an agricultural country into an industrial country, and those new industries became dominant. Even though the destruction caused by the wars was irreversible, the strong industrial foundation provided great help for post-war recovery in Germany. The Marshall Plan³⁰ has provided the economic supporting for the recovery in Germany.

In 1908 the German Committee for Technical Education (DATSCH) has been set up to do research on the apprenticeship in the new industries [152]. And later the German Institute for Technical Vocational Training (DINTA) founded in 1928 to make more research on occupational science and occupational didactics [152]. The systematic works from DATSCH have been developed after the Second World War and carried by the Center for Vocational Training (ABB) in 1953 and later by the Federal Institute for Research on Vocational Education (BBF) and then the Federal Institute for Vocational Education (BIBB) [152]. Another hand the Great Depression of 1929-1933 the vocational schools were treated as a policy to overcome the high youth unemployment through the whole society [20]. During this period, the policy about vocational education was to establish related vocational schools through the whole country and to add vocational education in the whole education system [80].

³⁰The Marshall Plan (officially the European Recovery Program, ERP) was an American initiative passed in 1948 for foreign aid to Western Europe. Source: Wikipedia.

During this period, the promotion of vocational education has always been ensured by the law. The Weimar Constitution (August 11, 1919) and the Foundation School Law (Grundschulgesetz April 28, 1920) has regulations about all youth under 18 years old in Germany should take a compulsory vocational education and the instruction and instructional materials were free [124]. Later the Reichsschulpflichtgesetz was set in 1938 and among it, the vocational education part was about the students after normal compulsory education they had to take compulsory vocational education in vocational schools. If there were special facilities for this occupation in vocational schools, apprentices should take courses in vocational schools until the end of contracts. The Vocational Training Act of 1969 has established a standardized legal framework for vocational education and training [81] and it has represented the beginning implement of the dual system. Before in the 1960s in the discussions and debates, every economic sector should consider different characteristics and provide important arguments for the law.

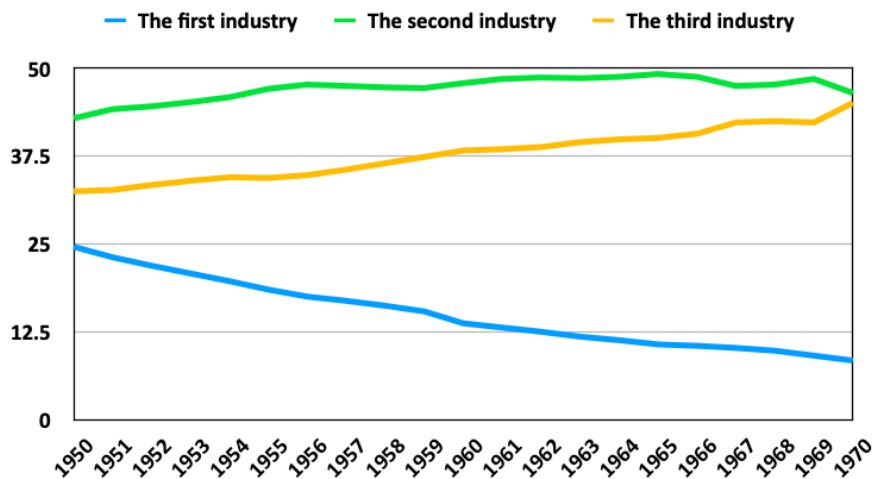


Figure 3.5: The proportion of employment positions in Germany 1950-1970.
Source: Startseite - Statistisches Bundesamt (Destatis)

The fig 3.5 shows the proportion of employment positions in Germany from 1950 to 1970. After the war, the second and third industries in Germany developed well, and more related workers would be needed in the labour market. Many researchers have declared that one reason for the recovery of the post-war German economy was support from vocational education [92].

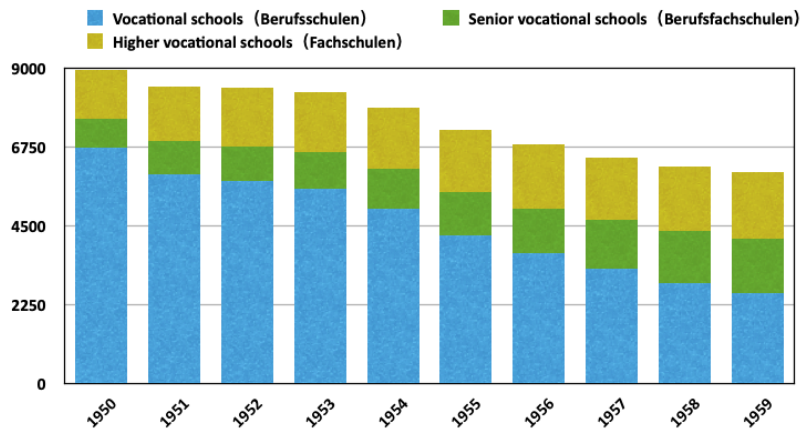


Figure 3.6: The number of vocational schools in west Germany 1950-1959.
Source: Startseite - Statistisches Bundesamt (Destatis)

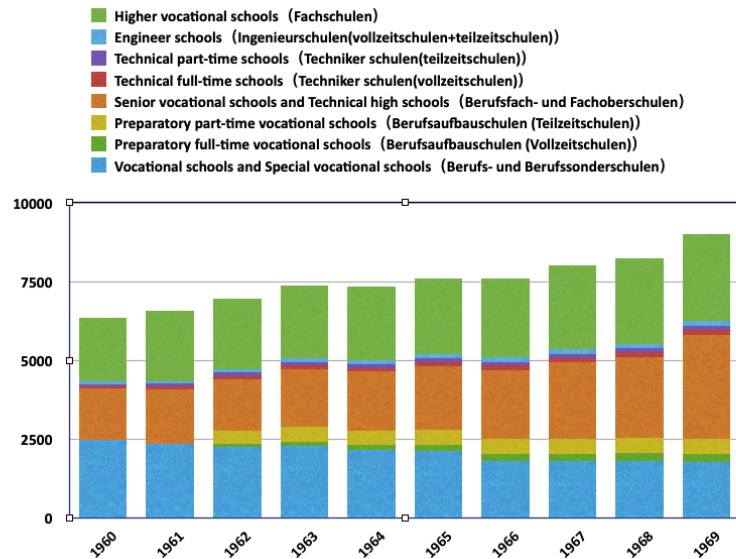


Figure 3.7: The number of vocational schools in west Germany 1960-1969.
Source: Startseite - Statistisches Bundesamt (Destatis)

There are several changes about the vocational schools we can see from fig. 3.7 and fig. ???. The number of vocational schools and senior vocational schools has decreased from 1950 to 1959, and in the next 10 years, more types of vocational schools were established to meet different groups' interest. More technical schools and engineer schools were set to train technical workers and engineers who were needed in the development of modern industries [128].

From the 1920s to the 1970s, the two elements in the dual system explored how to work together. The related education research institutions were established during this period, and modern education theories were applied to vocational education. The economy recovered and expanded after the war. To cultivate the talent to meet the demands of economic development, the economic sector also paid attention to the training system to provide guidance for cooperation between companies and vocational schools. The Vocational Training Act of 1969 was set up against this background, making VET into a law-based system. Since then, the dual system in Germany has been promoted well.

3.4.2 MODERN GERMAN VOCATIONAL EDUCATION SYSTEM 1970S-1990S

This chapter has introduced an overview of the historical development of VET in Germany. This section will describe the modern dual system and mainly focus on the whole structure of how the system functions. As we know, the modern dual system was founded on the Vocational Training Act (Berufsbildungsgesetz, BBiG, 1969) [48] a, and the two elements in the dual system were involved in one system. And the Vocational Training Act was upgraded into 2005 (BBiG, 2005), it has three main parts about the rules on vocational education and training in Germany.

- The first part presents the general rules underlying the definition, training locations and range of applications of VET in Germany. The objectives of VET include initial training, further training and retraining.
- Part two presents a detailed explanation of employers and apprentices—for example, the regulations on training contracts, training content, training period, duties and responsibilities of both participants, allowances for apprentices, assessment standards, conditions for contract cancellation, training for disable persons, etc.
- Part three is about the rules on VET organizations. The issues are the determination of responsible agencies, regulatory authorities, competent authorities, research institutions, etc. [17]

It is clear that the BBiG largely focused on the one element, the training place, and most regulations were about training-related content. In relation to vocational schools, they also played an important role in the dual system. Since the 1970s, types of vocational school have developed and changed.

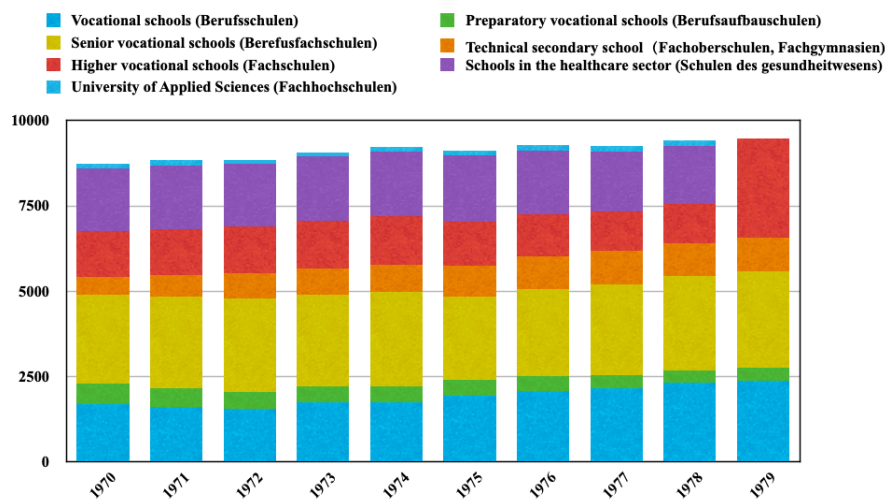


Figure 3.8: The number of vocational schools in west Germany 1970-1979.

Source: Startseite - Statistisches Bundes

The fig[3.8] describes the types and changes of different vocational schools in West Germany

from 1970 to 1979. The number of vocational schools has a big increase of around 40%, the number of senior vocational education has also increase 8.5% and the number of technical secondary school has increased 83.9%. The technical secondary school had a new definition after the West German student movement³¹ and those schools provided for students who finished the initial vocational education and preferred to pursuer higher vocational education or academic education. It represents a flexible transition from the vocational education system to the academic education system. The number of preparatory vocational schools has decreased 34%, the number of higher vocational schools and schools in the healthcare sector has separately reduced 14.9% and 7% from 1970 to 1978. In 1979, the database has merged those two numbers, thus here no consideration.

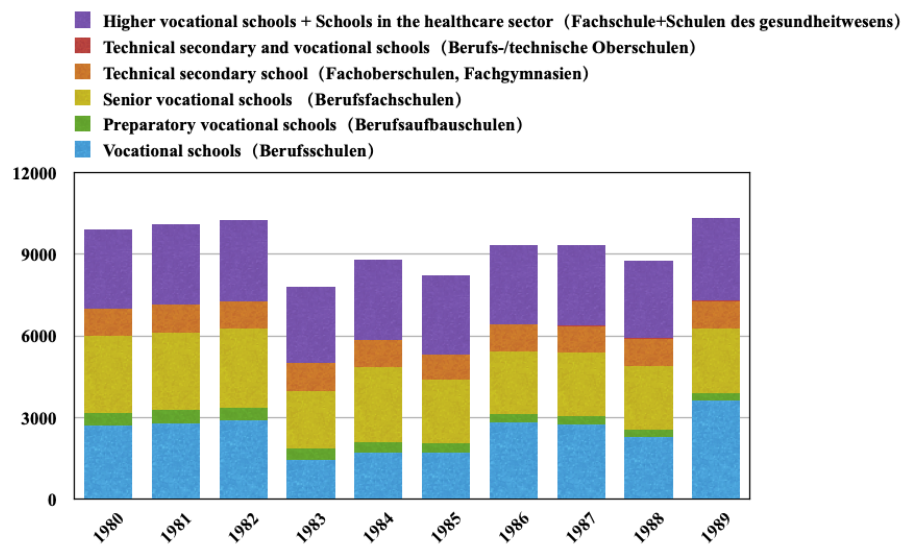


Figure 3.9: The number of vocational schools in west Germany 1980-1989.

Source: Startseite - Statistisches Bundes

From fig^{3.9} we can see that the types of vocational schools have no change, while the number of different vocational schools has a lot of changes during these ten years. The number of vocational schools has increased 35.1% in the past 10 years, as the main vocational school type in the dual system it has increased too much than other types. The number of preparatory vocational schools and the senior vocational schools have both decreased respectively 43.6% and 15.6%. The number of technical schools has not an obvious change and it only has added 13 new schools. While the number of higher vocational schools and schools in the healthcare sector has been calculated together and it also has a little change about 3.6% increasing. Until 1989, the types of different vocational schools in West Germany has tended to be stable and the vocational school as the school part for initial vocational education and

³¹The West German student movement or sometimes called the 1968 movement in West Germany was a social movement that consisted of mass student protests in West Germany in 1968, participants in the movement would later come to be known as 68ers. Source: Wikipedia.

training has the most obvious change and it has enhanced 113.5% after 1970, which could mark that in those 20 years (1970-1989) the dual system in West Germany had great progress. And other types of vocational school also have developed for different functions, some for students who finished the initial training and then hoped to pursue further education, some for special majors like the schools in the healthcare sector. And the level of VET is clear from initial to a higher level. Anyway in 1989, no matter the structure for apprentices in the training companies or the vocational schools in the education system they both developed well and formed a special vocational education system.

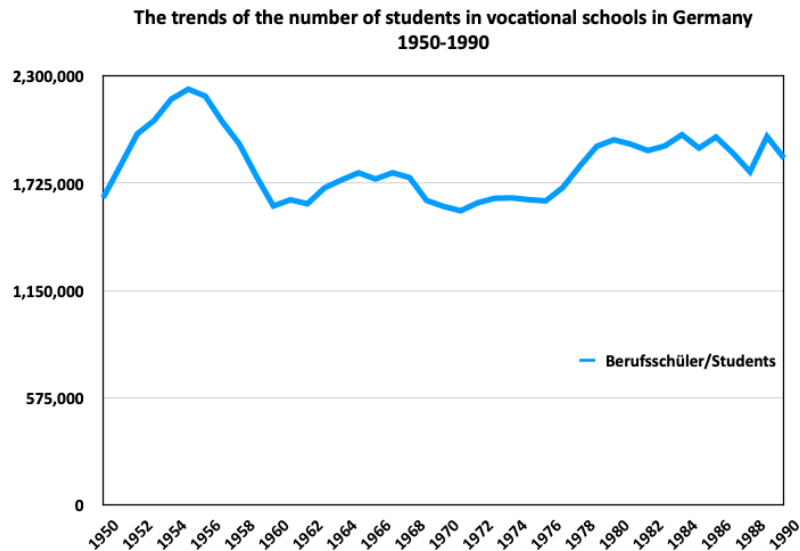


Figure 3.10: The number of students in vocational schools in Germany 1950-1990
Source: Startseite - Statistisches Bundes

Fig 3.10 shows the number of students in all vocational schools in Germany from 1950 to 1990. From 1950 to 1960, there was a development wave, and this was an unstable period for the VET system in Germany. During this ten-year period, types of vocational school were stable, and the change was in the proportion of different types of vocational school. From 1960 to 1980 was a relatively stable period with little change in students. Furthermore, during this period, the VET law was established to guarantee the interests of all participants in the VET system. There were more types of vocational school than before to meet different persons' requirements. From 1980 to 1990, the number of vocational students developed steadily. Following the foundational work of the previous decades, the German VET system was in a stable situation and it attracted a steady stream of vocational students.

3.4.3 MODERN GERMAN VOCATIONAL EDUCATION SYSTEM SINCE 1990S

In 1990 West Germany and East Germany has been reunion and the dual system in West Germany has been applied to East Germany. From the fig 3.11, the types of vocational schools in Germany was fixed during this period. Those three schools, vocational schools, senior vocational schools and higher vocational schools have different wave development trend. Around 2000 the number of vocational schools has been decreased 9.7% (from 3596 to 3277), the number of senior vocational schools has increased 80.4% (from 1853 to 3343) and the number of higher vocational schools has increased 25.3% (from 1369 to 1715) . While the technical senior schools have increased 38.3%. There are two possible aspects that could explain the decline of vocational education and training. The first one is about that after re-unification boom there was an economic recession in Germany [56] and the number of people in employment has declined. Another reason is that under the background of Bologna process [32] the number of students who attended in higher education still has increased. The evidence came from the number of technical senior schools were provided general education for students who achieved the initial vocational education and through those schools, they would have a higher probability to pursue higher education again.

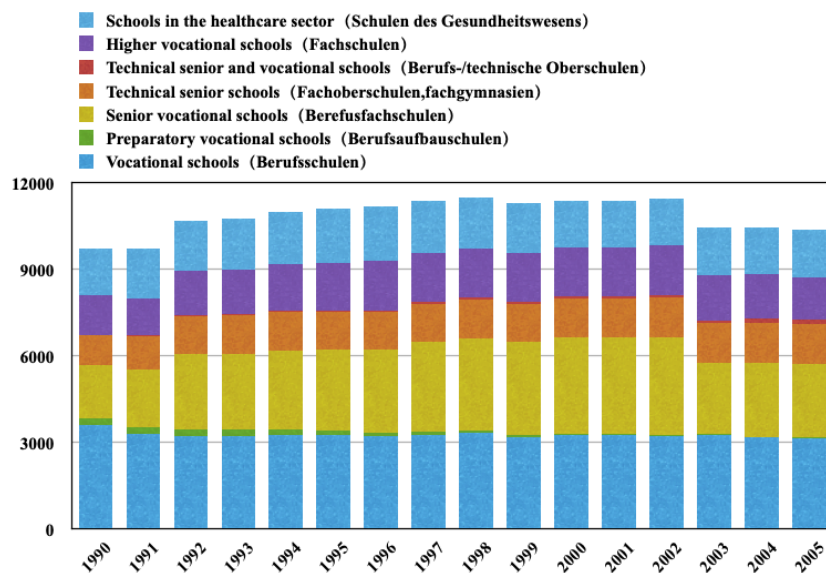


Figure 3.11: The number of vocational schools in Germany 1990-2005.

Source: Startseite - Statistisches Bundes

In 2005, the Vocational Training Act was enacted to improve the attractiveness of vocational education. Of course, the factors which could influence the choice of vocational education are various, going beyond the demand in the labour market or the promotion of general or

³²The Bologna Process is a series of ministerial meetings and agreements between European countries to ensure comparability in the standards and quality of higher-education qualifications. Source: Wikipedia.

vocational education. The following chapters will analyse more indicators which could affect students' choice of vocational education in recent years.

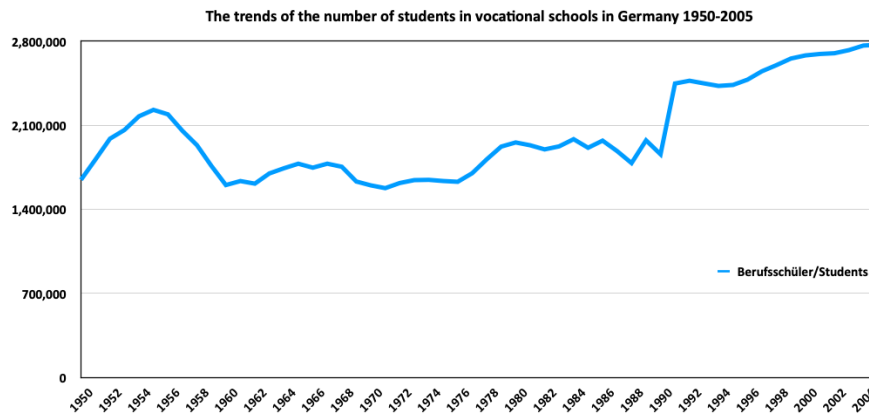


Figure 3.12: The number of students in vocational schools in Germany 1950-1990-2005
Source: Startseite - Statistisches Bundes

To make the changes clear, the fig. 3.12 adds the number of vocational students from 1990 to 2005. Since 1991, the number of vocational students has increased 31.7% than 1990 (from 1,858,718 to 2,448,283). Statistics do not only include West Germany, but also East Germany, and the education system from the Federal Republic of Germany has been applied into the whole re-united country. After unification, the political and economic environment developed more steadily, and the number of students in all kinds of vocational school also increased steadily. In general, there are three main stages to represent changes in the number of vocational students in Germany. From 1950 to 1960, all sectors of German society were in a post-war recovery situation. In vocational schools, the number of students was unstable. From 1960 to 1990, changes were less obvious and it was stable period for the development of the German VET system, when all types of vocational school and the number of vocational students stabilized. What's more, the foundation of the Vocational Training Act 1969 promoted more standardized and legalization in the VET system. After 1990, Germany has reunited and the stable VET system in West Germany was promoted in the whole country. That VET system in Germany has developed until today.

3.5 CONCLUSION

The German VET system has been introduced to other countries as an exemplary training model in recent years, and there are two main reasons. One is that it could promote the borrowing countries' economic growth; the other reason is that it is believed to reduce the youth unemployment rate in local areas [62]. Applying the dual system into one country or one area is not feasible: the target, structure and culture in every area should be considered. Of course, the dual system is not an independent education system, and it is deeply influenced by history and culture. In modern society, the targets of the dual system in Germany are diverse: for example, to promote economic growth, social integration and individual development [62]. However, the whole VET system is affected by other social subsystems, like the employment system, the legal system or the economic system. This chapter has mainly introduced the historical process of the dual system in Germany. The aim now is to arrive at some conclusions about the historical influence of the traditional culture.

The characterises of technical and vocational education and training in Germany

	- 1870s	1870s - 1920s	1920s - 1970s	1970s -
Mode	The apprenticeship under guilds	The apprentice under government	The modern vocational schools + Training in the workplace	The dual system
Fields	Handicraft industry	Handicraft industry + modern industries	Handicraft industry + modern industries + service industries	Handicraft industry + manufacturing industries + service industries
Relationship	Mentorship	Employment relationship	Employment relationship + Compulsory education	Employment and education relationship under BBiG (The Vocational Training Act)
Training place	Family workshop	Industry factory	Industry factory + vocational school	Training companies + public vocational school
Evaluation standard	Guild recognition	Factory recognition	Factory recognition + graduate certificate	National vocational qualification certificate
Economic function	Industry development and balance	Demand of workforce in the new industries	Economic productivity for workforce	Related economic productivity for workforce
Social function	Citizens identity	Youth integration	Social integration	Social integration and individual development

Figure 3.13: The characterises of technical and vocational education and training in Germany in different history periods

Based on fig.3.13 conclusions can be drawn about VET in different periods in Germany. Firstly, before the 1870s, Germany was not a united country and in the Middle Ages, most European areas underwent an urbanization movement. The main industry changed from agriculture to the handicraft and trade industry. The related handicraft production and trade with geographical characteristics was often concentrated in one city or several surrounding cities, and the establishment of guilds was normally to protect the industry's interests in the local market. The guilds limited entry to their industry to maintain a market balance, and they controlled the right to cultivate apprentices. Effective trade competition promoted local economic development while the related skills remained through the apprenticeship. What's more, in medieval Europe, the demographic increased and towns and cities expanded with

the development of the economy. At the same time, the population living in rural areas transitioned into urban areas. An effective way to help those people obtain a citizen status and job positions in towns was through apprenticeships. As a social union in the local area, guilds always had good cooperation with the local government to improve economic productivity; in return, the government granted worker status to those who passed the guild assessments. The apprenticeship is the historical origin of one element in the dual system, training in the workplace, and during this time it was deeply influenced by the local guilds and mainly met the interests of guilds.

The next period, 1870–1920, saw a lot of changes in the whole society, whether politically or economically. In 1870, Germany was merged into a unified country, and Germany was affected by two industrial revolutions originating in England. The industrial revolutions introduced new technologies, new production methods which shocked the original handicraft industries. The guilds during this period hindered the pace of free trade in Germany: the government recalled the right of apprenticeship management and, considering the need to protect traditional handicrafts, the guilds kept apprenticeship supervision rights. Especially during the second Industrial Revolution, Germany began to build factories to develop the new industries and, combined with local natural resources, the steel, coal and chemical labour-intensive industries developed well in Germany. To meet the demand for skilled workers in those industries, the government promoted and expanded vocational training in this period. While the training method was based on the traditional apprenticeship in handicraft industries, it could not function well. On the other hand, in the late nineteenth century, the widespread economic depressions led to an unstable German society: parades continued and many young people participated. The government realized that compulsory vocational education would help youths better integrate, and related laws regulated that youths under the age of 18 must be educated in vocational schools. At the same time, modern education theories were applied to vocational education to promote individual development. During this period, the development of the economy and changes in production methods changed the demand for the labour force. The skilled workers training method was continued from the traditional apprenticeship, and it was not working very well. Vocational schools, as another element in the dual system, began to be set up to help youths have better social integration.

In 1938, Germany became the first country to change vocational education into a compulsory education system. Considering the social problems at that time—the Great Depression had a deep influence on the society—the expansion of vocational schools did not just promote economic growth, but was a means to reduce youth unemployment and help youths better integrate into society. During the 1920s–1970s, Germany experienced quite turbulent times, especially after two World Wars, and all aspects of society had been destroyed. Germany achieved economic recovery quickly after the war, and many researchers have attributed one of the reasons to the VET system [160]. The 1970s were a period of exploration of cooperation between training in the workplace and vocational schools. There was a high demand for skilled workers in every industry, especially in the manufacturing industry. From 1950 to 1969, the proportion of employment positions provided by the secondary sector in-

creased by 13.1% (from 42.9% to 48.5%). While, as the main vocational school type, the number of initial vocational schools (Berufsschulen) decreased by 295.4% (from 6730 to 1702). Considering the demand in the labour market, the plight of apprenticeships, the decrease in vocational schools and other factors, all related stakeholders, including the federal government, the economic sector, the education sector, trade unions etc. joined together to discuss the formulation of vocational education laws. The formulation of the Vocational Training Act 1969 established the basic structure of the dual system, the definition of vocational education, and the general rules for the dual system. In fact, it regulated the training company element, while the other element, vocational schools, was still managed by the related education laws.

After the 1970s, the VET system entered a relatively stable period. In the past few decades, the economic structure in Germany had depended on exports to some degree and its export advantage lay in intermediate technical fields, such as automobiles and parts, chemicals, electromechanical tools and electrical appliances. The dual system played an important role in providing related skilled workers in those industries, and the number of initial vocational schools had increased by 71.1% in 2018. During this period [Which period?], vocational education was not only focused on economic demand or the social integration problem for youths, but also on individual development. In the VET system in Germany, there are several types of vocational school with different functions for students which can be divided into three main types depending on the institutions and the courses they provide. The first, of course, is the vocational school (2-3 years), which cooperates with enterprises to help students transfer to the labour market better. The second type is full-time vocational school (2-3 years), which, like the ordinary vocational full-time school (Berufsfachschulen), normally provides general education for the students who finish the initial vocational education in the dual system as a path to higher education. The third type is the preparatory vocational school (Berufsaufbauschulen, 1-2 years). This is a kind of occupation guidance school to help students decide whether to accept vocational education in the future or which kind of occupation training to choose. The whole system provides different choices for students and focuses more on students' individual development. It is flexible and has different paths to enable a mutual transformation [This needs to be rephrased.] with general education.

In summary, in the medieval period, the direct aim of apprenticeship was to serve the local social union guilds, and it was more to meet the interests of the guild than for the economic development of the entire society. In turn, it was precisely because of the development of handicrafts and the commerce industry that the guilds could be formed. Later, with a united country established in Germany, new production methods appeared. Apprenticeship at this time was directly to serve the new industries, while the foundation of vocational schools was mainly to promote low-class youth social integration, not for an economic reason. From the 1920s to 1970s, apprenticeship continued to develop in industries to cultivate the demand for skilled workers, while the vocational school was added into the whole compulsory education system to play a greater role in youth social integration. In 1969, the Vocational Training Act facilitated the foundation of the dual system, and school-enterprise cooperation made voca-

tional education more in line with the needs of economic development in Germany. The low youth unemployment rate proved that youths could be integrated into society better through vocational education. More vocational school types were designed in the vocational education system to meet different demands for the development for students. It is clear that the VET model in Germany developed from a social union to a national administrative system, and the aims were different in different periods, from protecting the guilds' interest to promoting economic development and youths' social integration and individual development. In other words, a VET system can be seen as a tool to achieve some aims in one country or area to some degree, and different countries have different targets. What's more, the VET system is influenced by other social subsystems—for example, the economic structure in Germany, the tradition of training in the workplace, etc. As a result, the VET system in Germany is unique. It has a special historical background and it serves specific targets.

4 FACTORS INFLUENCED ON THE ATTRACTIVENESS OF VOCATIONAL EDUCATION AND TRAINING IN CHINA

4.1 INTRODUCTION

In the past almost 20 years, the number of new entrants in all kinds of vocational school in China has undergone significant change. From fig.4.1 shows how, from 1997 to 2010, the number increased; at the same time, the number of new entrants in vocational schools was always higher than the number in universities until 2013. Since 2010, the attractiveness of vocational education has decreased. In contrast, the attractiveness of higher education has continued to increase since 1997.

As we know, the main student population for both higher education and vocational education is aged 15–24. This number in China in the past 20 years has been relatively stable, though since 2010 it has seen slight decrease (see fig.4.2). The age population in vocational education and higher education did not show an obvious change from 1997 to 2018, while the numbers of new entrants in the two kinds of institution are totally developed into two different aspects.

As a lot of different research states, vocational education has a lot of advantages for our society, such as decreasing the rate of youth unemployment. International comparisons of youth unemployment rates show that countries that place high importance on apprenticeship or the dual VET system, such as Germany, Austria and Switzerland, have lower unemployment rates and better transition from school to work than other countries [44]. Thus the Chinese government also focuses on improving student participation in vocational schools.

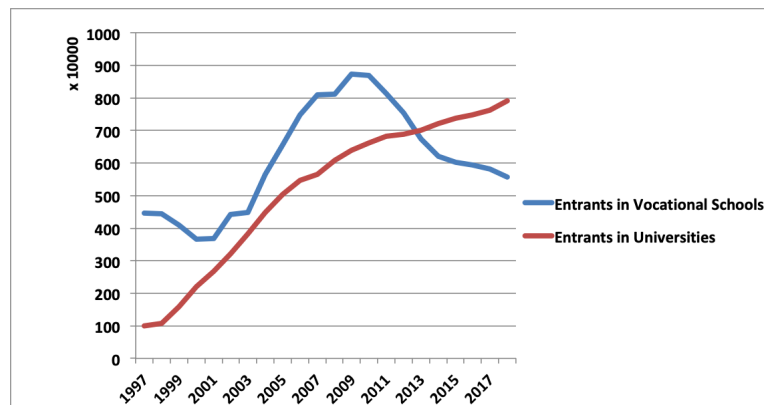


Figure 4.1: The number of new entrants in the universities and in the vocational schools in China from 1997-2018

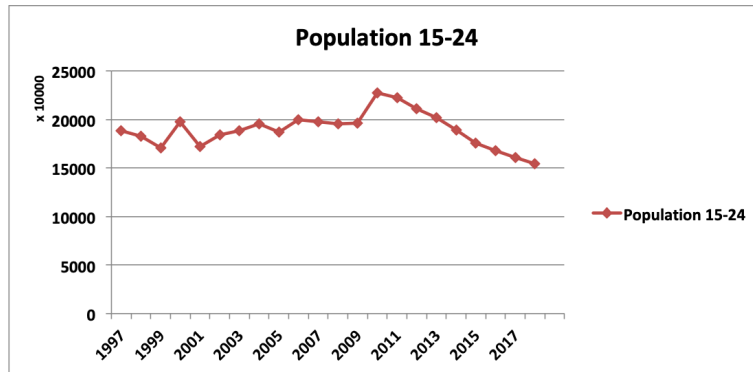


Figure 4.2: The number of population 15-24 in China from 1997-2018

The Chinese Government Report 2019 declared a large-scale expansion of 1 million new entrants in vocational colleges in 2020. It stated that the government would reform and improve examination and enrolment methods in higher vocational colleges and encourage more high school graduates and veterans, laid-off workers, migrant workers, etc. to choose vocational education.

The research purpose in this chapter is to find the factors influencing students' choice of vocational school in China. Further analysis focuses on which factor has the greatest influence on the attractiveness on vocational education.

4.2 LITERATURE REVIEW

4.2.1 THE STUDENTS COLLEGE CHOICE MODEL

The first problem is how to find as many related factors as possible. Based on this question, American students' college choice is used as the basic model here. There are three reasons to choose this model:

- The first reason is that, according to the previous research, since the end of the Qing dynasty, the modern Chinese education system has been built on the foundation of Western countries like America or European countries' education model [9].
- Furthermore, according to Moogan and Baron, most research about potential students' college choices has been conducted in America [139] [140].
- The principle of duality, initially borrowed from the well-established brand of the dual system of initial vocational training to describe a learning programme that takes place in two venues, has developed its own currency and seems to be gaining traction in the area of higher education (HE). [18].

Thus, the model of college students' choice is used as the research basis in this chapter. The following introduction outlines the framework of this research model. Fig 4.3 shows that there are three main components in this model:

- an economic approach, wherein some factors such as the labour market, political policies and so on will likely influence students' choice [155];
- a sociological approach—for example, population and unemployment rate, especially among youths, will have some influence [155];
- and which enhances both, combining parents' suggestions, institutions' reputation, teachers' participation and so on, which will also influence youths' decisions [28].

The research model suits the American situation very well. To apply it to an analysis of the Chinese situation, changes need to be made and some special factors in China added. Thus the next step is to explain and add every single factor which is relevant to the Chinese case, forming the unique Chinese model.

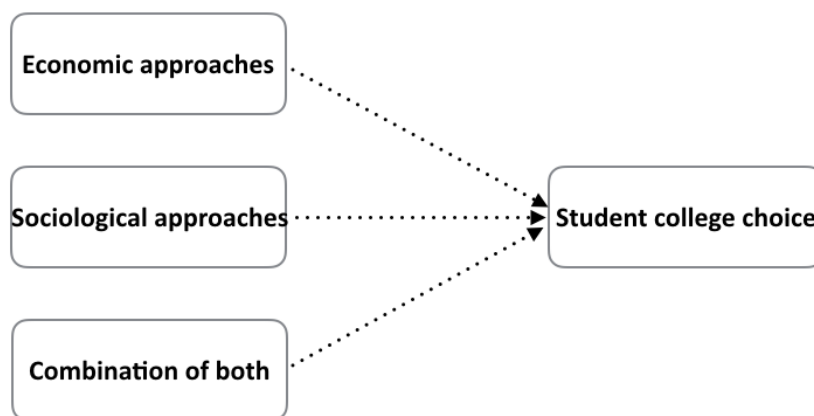


Figure 4.3: College student choice model in the United States

4.2.2 SINGLE FACTORS EXPLAINING

The first component is economic, and many single factors are included under this branch.

- Based on Perna and Titus, there is some influence of public state policies on students' choices, involving direct investment in institutions, direct finance for students and tuition. [156].
- Furthermore, general economic recessions usually reduce job market opportunities in positions traditionally held by non-college graduates more than they reduce opportunities in positions normally held by college graduates. When conditions in the college job market deteriorate, enrolment tends to favour colleges emphasizing professional or vocational curricula. However, when college job market opportunities increase, enrolment tends to favour colleges emphasizing traditional liberal arts and science curricula [154].
- The changing significance of the opportunity structure reminds us that sociological theories of the labour market need to be sensitive to individual explanations as well. Though it is important to consider the individual within a concrete social context, our findings regarding the significance of career stage illustrate that variation at the individual level is also important [201].
- Job market signalling, company recruitment behaviour and the respective general regional conditions in the labour markets may be mentioned as possible explanations for differences in the likelihood of progressing to VET [175]. Unlike academic education, vocational education is prepared for students to enter into the labour market directly [168]. The distribution of the labour force in different industries in the labour market also gives a signal as to which industries are more popular. It is also a guide and standard for new student entrants to choose majors in vocational schools.
- Based on the experience in Eastern Europe, there is a difference between the earnings and employment advantages of VET graduates and university graduates [177]. Average salary level has been treated as a learning motivation for students in vocational schools.

In general, students probably consider the quality of institutions in relation to the effect of economic policies on the institutions themselves; at the same time, they maybe consider the environment outside the schools, including the labour market and economic status.

The outside environment does not only concern economic factors: some sociological factors have an influence on the attractiveness of education choice.

- International comparisons of youth unemployment rates show that countries that place high importance on apprenticeship or the dual VET system, such as Germany, Austria and Switzerland, have lower unemployment rates and a better transition from school

to work than other countries [44]. The dual system in Germany brings a lower youth unemployment rate, which means through VET it is easier for young students to find a job position in the future. It provides more opportunities for those students who are not good at academic education to transfer into the real workplace more smoothly.

- A marked social class dependency exists with respect to the German general schooling system: the higher the social class, the greater the likelihood of educational success in general [10] and a better transition to VET [13].
- Nevertheless, there is also evidence that the likelihood of progression to company-based training for migrants is lower if the varying occupational preferences are taken into account [13]. Correlations between social origin and ethnicity or migrant background in schooling or training are also a subject of interest in other countries [63] [185].
- Young women have performed significantly better than young men in general schooling in Germany for a long time and are considerably more likely to acquire a higher education entrance qualification. Nevertheless, young women have a lower likelihood than young men of accessing vocational training, and this circumstance also applies after controlling for varying prior learning in school across individuals [11].
- In the past ten years, with the tightening of the labour market and the increase in youth unemployment, the number of retired workers has been greater than the number of young skilled workers. Demographic change offers unprecedented opportunities to deepen rather than widen investment in human capital [59].

The research model includes some factors that belong under the heading of both economic and sociological factors and some that belong to neither.

- The (academic) reputation of the institution is one of the factors ranked high in USA surveys [74]. Both students and parents prefer to choose high ranking institutions, which represents better education quality, better education sources and so on.
- Other quality aspects, such as a good faculty and the quality of the programme in the intended major, are also important [99]. This represents the important role of vocational teachers in vocational schools, who need basic education and further training to guarantee their teaching professionalism [40]. Phil(1998) has said that humans are the most important resource in any organization, and the function of vocational teachers offers a special explanation of this statement [97]. As vocational teachers, they are not only responsible for teaching theory, but also for skills guidance. The long-term personal and professional growth of vocational teachers related to the teaching quality for students [97].

- Employers are a main policy target, especially in countries where their involvement is weak [177]. Employers are the main receivers of graduates from vocational schools. If they can take part in the education and training process, this could be an attractive factor, as that they will have a keen idea of which skills they want to teach for the real world of work.
- A learner's experience and perception of VET is greatly influenced by the competence of learning facilitators, including teachers and trainers [188]. Teachers and trainers directly participate in the education process, and a lack of competence among them will affect the level of education quality.
- Making good use of the internet can improve the accessibility of information on IVET, and involving employers and young people in promotional activities can demonstrate that IVET is an up-to-date, relevant sector offering quality education and training leading to attractive careers [188].

There is a situation whereby students may know little or nothing about vocational education, because they have little chance to gain relative knowledge about it. Thus, increasing advertisement of vocational education through TV, the internet or education department activities is also a good way to attract more students to know what vocational education is. The next step is to consider whether to choose it or not.

- Progression pathways including opportunities for transition to higher education and credit transfer [188]. In China, for example, some students who choose vocational education do so mainly because they are not good at study in the general education system. They choose vocational education, and after graduation, they maybe prefer to find a progression pathway to continue general education if they find it is convenient to transfer their credits from vocational schools to normal schools. Otherwise, they may give up vocational education and spend more time on general education. In China, for example, there is an entrance exam for all students after nine years of compulsory education; after this exam, students can choose high schools or vocational schools, mainly based on their scores. Most students in vocational schools hope to go to university after passing the college entrance examination: thus the progression pathway is another important attractiveness factor.

Based on the previous analysis and the American college choice model, I outline a new model which is suitable for the Chinese case in this chapter.

Here Fig. 4.4 states the factors which have a possible influence on the attractiveness of vocational education choice in China. In this model, it is assumed that every factor has a relationship with the result based on every theoretical support. The next step is to test all factors

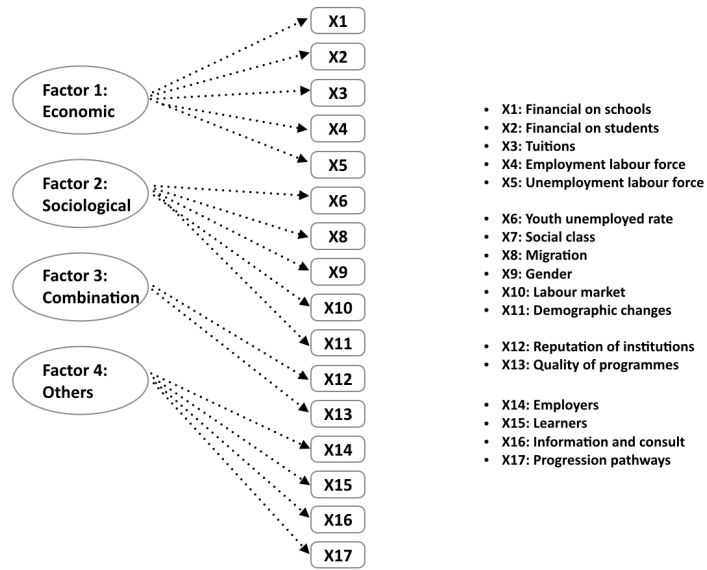


Figure 4.4: The attractiveness model in China

with a view to verifying which have a positive influence which a negative influence.

4.3 METHODOLOGY

In this section, the main research method is the linear regression analysis also called the ordinary least squares (OLS) regression. Using ordinary least squares (OLS) regression, the results are shown in a scatterplot and a regression line to present the relationship between the dependent and independent variables. One regression equation will also be calculated at the same time using the formula $Y = a + bx$. We focus on two values: the coefficient of determination (R-square) and the regression coefficient (b). R-square helps us to test the degree of correlation, while the value of b determines whether it is a positive or negative factor. This single-factor regression analysis is the first step. The next step is using the OLS regression model to verify which factors are the most positive and negative factors.

All data are divided into two types, with one dependent variable and several independent variables. The dependent variable is the attractiveness of vocational education, which is the number of new entrants in all kinds of secondary vocational school in China from 1997 to 2018. All independent variables are obtained from a combination of the research model at the end of section 2 and the data collected from the Chinese Statistical Yearbooks. They are factors about the number in the employed labour force in the primary, secondary and tertiary sector industries; the youth unemployment rate; the number of female and male students; the number of female and male teachers; minority teachers and students; the population aged 15–24; schools; full-time and part-time teachers, and graduates. All data were collected from the Chinese Statistical Yearbooks from 1997 to 2018.

The research assumption is that all the above independent variables are related to the dependent variable. Under this assumption, the first task is to analyse every factor by simple linear regression and, through every scatterplot, regression line and regression equation, to determine the real related factors. The next task is to use multiple-factor regression analysis based on the first step to get the final result in terms of which factor has most influence on the attractiveness of vocational education in China.

The research questions concern three points. The first concerns which factors are related to the attractiveness of vocational education based on the research model and to what degree those factors are positive or negative. The second question concerns whether those related factors show the same result as prior literature. The third question seeks to offer possible explanations for the Chinese situation.

All data will be analysed based on normalized data, because calculating all numbers between 0 and 1 will make the results clearer and more understandable. The normalized equation is equ 4.1 and the result table is tab 4.1.

$$X_{new} = X - X_{min} / (X_{max} - X_{min}) \quad (4.1)$$

Table 4.1: Normalised Chinese Data

Years	Attractiveness	Female students	Male students	Full-time teachers	Other staffs	Female teachers	Male teachers	Population female 15-24	Population male 15-24	Graduates
1997	0.151	0.120	0.174	0.161	0.251	0.183	0.194	0.214	0.208	0.141
1998	0.150	0.150	0.161	0.204	0.341	0.186	0.292	0.205	0.204	0.151
1999	0.138	0.153	0.155	0.204	0.303	0.184	0.273	0.194	0.189	0.157
2000	0.123	0.145	0.144	0.192	0.272	0.174	0.250	0.224	0.219	0.164
2001	0.124	0.149	0.123	0.170	0.265	0.163	0.227	0.194	0.192	0.153
2002	0.149	0.141	0.146	0.175	0.225	0.155	0.217	0.208	0.204	0.141
2003	0.153	0.155	0.125	0.160	0.216	0.171	0.183	0.213	0.210	0.136
2004	0.191	0.170	0.188	0.190	0.197	0.172	0.208	0.223	0.216	0.151
2005	0.221	0.190	0.215	0.201	0.204	0.175	0.223	0.215	0.205	0.175
2006	0.252	0.239	0.224	0.215	0.200	0.221	0.204	0.225	0.222	0.201
2007	0.273	0.256	0.251	0.231	0.200	0.230	0.217	0.222	0.220	0.223
2008	0.274	0.267	0.265	0.240	0.194	0.240	0.217	0.222	0.217	0.244
2009	0.294	0.281	0.275	0.242	0.187	0.242	0.215	0.220	0.220	0.260
2010	0.293	0.286	0.283	0.233	0.207	0.244	0.213	0.258	0.252	0.276
2011	0.274	0.312	0.256	0.237	0.195	0.244	0.211	0.249	0.249	0.277
2012	0.254	0.271	0.268	0.237	0.183	0.241	0.206	0.236	0.238	0.283
2013	0.227	0.245	0.245	0.233	0.170	0.237	0.197	0.222	0.231	0.283
2014	0.209	0.224	0.223	0.230	0.162	0.236	0.191	0.208	0.216	0.261
2015	0.203	0.207	0.215	0.227	0.153	0.233	0.184	0.192	0.201	0.238
2016	0.200	0.197	0.210	0.225	0.146	0.234	0.179	0.183	0.194	0.224
2017	0.196	0.192	0.212	0.225	0.143	0.236	0.175	0.174	0.186	0.208
2018	0.188	0.185	0.209	0.224	0.138	0.237	0.170	0.165	0.179	0.204

4.4 ANALYSIS

4.4.1 SINGLE FACTOR ANALYSIS

The first factor is the employed labour force. This factor is about all the total working age labour force in China. It is a total number and we can see from the fig 4.5 and equation 4.2, the number of R^2 equals 0.51868 and the number of the regression coefficient is 0.0949. Thus the first factor employed labour force is a positive medium factor.

The Statistical Yearbook divides this factor into three factors: the employed labour force in the primary, secondary and tertiary industries. Based on fig 4.6 and equation 4.3, it shows the value of the coefficient of determination is 0.17653 and the value of regression coefficient is -0.3117. Thus the second factor is the employed labour force in the primary industry is an extremely weak negative factor. In most vocational schools there are 19 professional classifications³³; agriculture, forestry, animal husbandry and fishery comprise a small proportion, which means few positions are provided in vocational schools. Since 2000, the scale of vocational education in agriculture in secondary vocational schools has gradually decreased, and most rural labourers do have not enough vocational education [195]. Historically, there is a

³³1.Agriculture, forestry, animal husbandry and fishery. 2.Energy and Environment Industry. 3.Energy and new energy industry. 4.Civil Engineering and water conservancy industry. 5.Processing manufacturing. 6.Petrochemical industry. 7. Light Textile and food industry. 8. Transportation industry. 9. Information Technology industry. 10.Medicine and health industry. 11. Leisure health industry. 12.Financial Business industry. 13.Tourism services industry. 14.Culture and art industry. 15.Sports and fitness industry. 16.Education. 17.Judicial services. 18.Public Relations Management and Services. 19.Other industry.

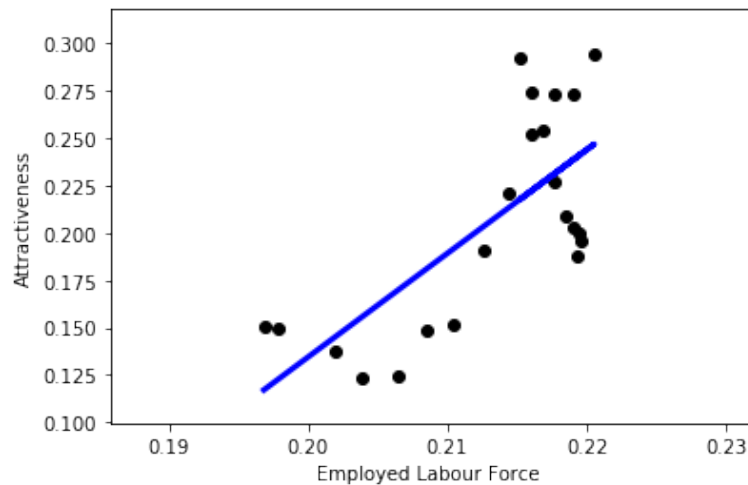


Figure 4.5: Single factor analysis: Employed Labour Force

$$Y = 0.0949 * X + 0.1935, R^2 = 0.51868 \quad (4.2)$$

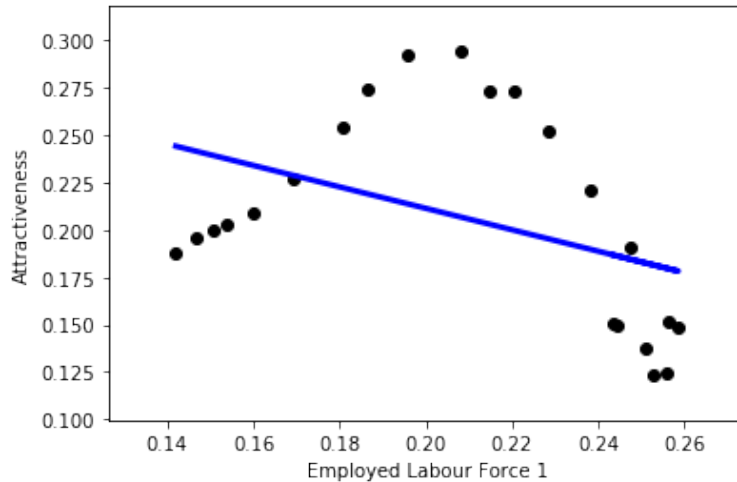


Figure 4.6: Single factor analysis: Employed Labour Force 1

$$Y = -0.3117 * X + 0.2735, R^2 = 0.17653 \quad (4.3)$$

tradition that the passing on of agricultural technology comes from experience, not education.

The factor of employed labour in the secondary industry has a different result. It describes from fig.4.7 and equation.4.4 that the number of the coefficient of determination is 0.51926 and the number of the regression coefficient is 0.4968, thus this is a medium positive factor. The greatest number of majors in vocational schools are focused on the manufacturing industry in China. The government promulgated an integrated manufacturing and education development project, mainly relying on vocational education-industry integration to improve the correlation of talent training with the development needs of manufacturing industry. To a certain degree, when the relationship between vocational schools and the manufacturing industry is closer, vocational education is more attractive.

The last factor related to the employed labours is the labourers in the service industry. It is showed from fig.4.8 and equation.4.5 that the coefficient of determination is 0.21043 and the regression coefficient is 0.14909. This is an extremely weak positive factor. According to historical experience, talent—especially junior skilled talent—in the tertiary industry in China is mainly trained by traditional apprenticeship instead of school education. Modern VET in China has recently focused on the secondary industry: one reason is that most occupations in the primary or the tertiary industry have been inherited from ancient professions, and so the training methods also have been inherited from ancient methods. They are not developed into a complete education system, compared with the manufacturing industry; however, the government has realized this problem and is trying to build a comprehensive talent training

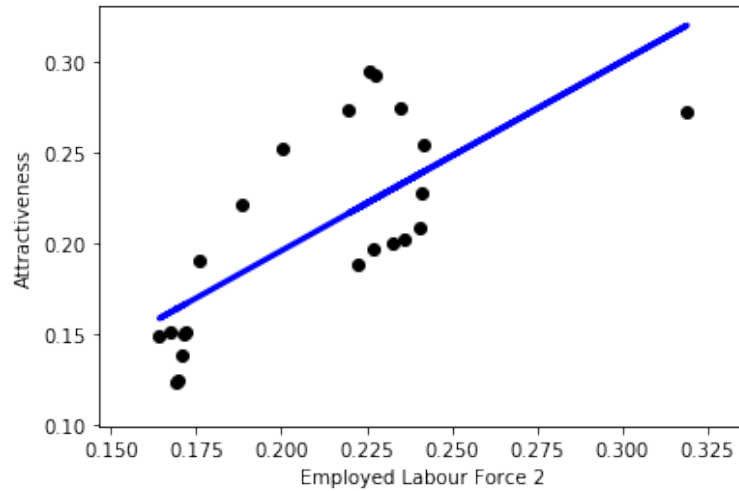


Figure 4.7: Single factor analysis: Employed Labour Force 2

$$Y = 0.4968 * X + 0.1075, R^2 = 0.51926 \quad (4.4)$$

system depending on vocational education.

All factors about the employed labour force in the previous part include all ages and are not specific to the research target here. The research target in this research is the population aged mainly from 15 to 24; there are limited research sources, and in the Chinese yearbooks, some factors are over the age limit. This is a limitation of the research. The next factor is the youth unemployment rate between the ages of 15 and 24 in China in the past 30 years. From fig.4.9 and equation.4.6 the value of R^2 equals to 0.35433 and the regression coefficient equals to 0.3371 and this factor has a weak positive relationship with the attractiveness of vocational education and training. Chinese teenagers prefer academic education to vocational education, and one reason for this is that they are dominated by the promised reward of academic qualification in science or other subjects [194]. The government treated the US higher education model, which has a heavy focus on academic achievement over useful skills, as an example to follow [194]. As a result, the youth unemployment rate may be more closely related to higher education than to vocational education. However, China has a production-oriented economy which needs more highly skilled talent rather than academic graduates, showing that higher education does not mean a higher employment rate. [194].

Reducing gender gaps in educational attainment has always been a priority of international education policy and it is one of the Millennium Development Goals(MDGs)³⁴ [144].

³⁴The Eight Millennium Development Goals are: to eradicate extreme poverty and hunger; to achieve universal primary education; to promote gender equality and empower women; to reduce child mortality; to improve

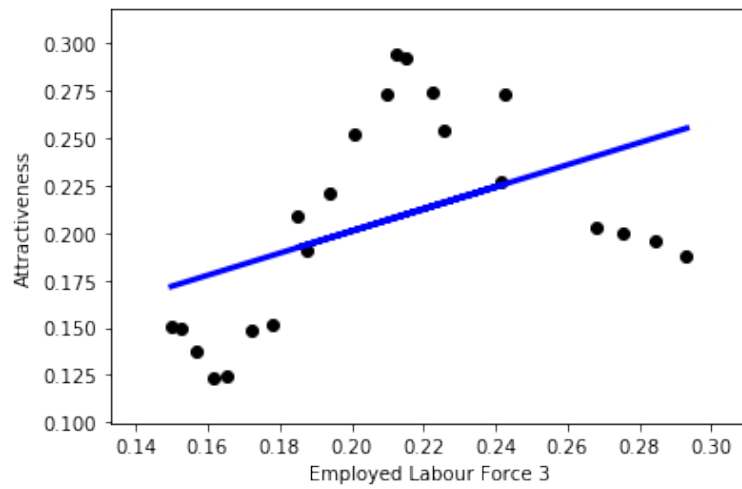


Figure 4.8: Single factor analysis: Employed Labour Force 3

$$Y = 0.14909 * X + 0.2008, R^2 = 0.21043 \quad (4.5)$$

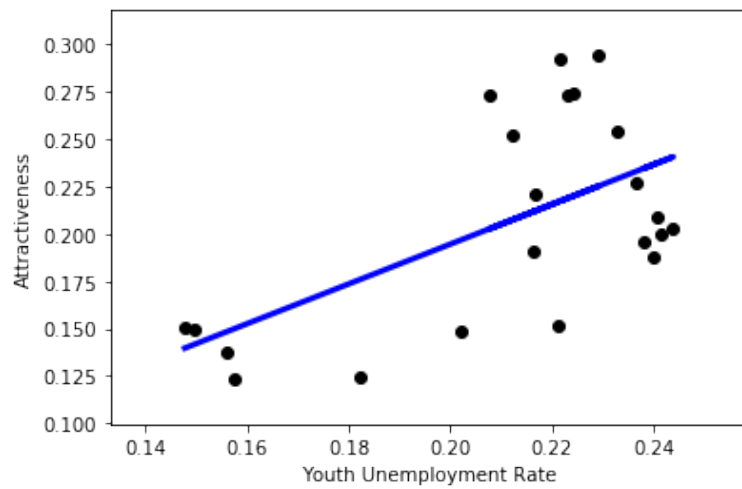


Figure 4.9: Single factor analysis: Youth Unemployment Rate

$$Y = 0.3371 * X + 0.1415, R^2 = 0.35433 \quad (4.6)$$

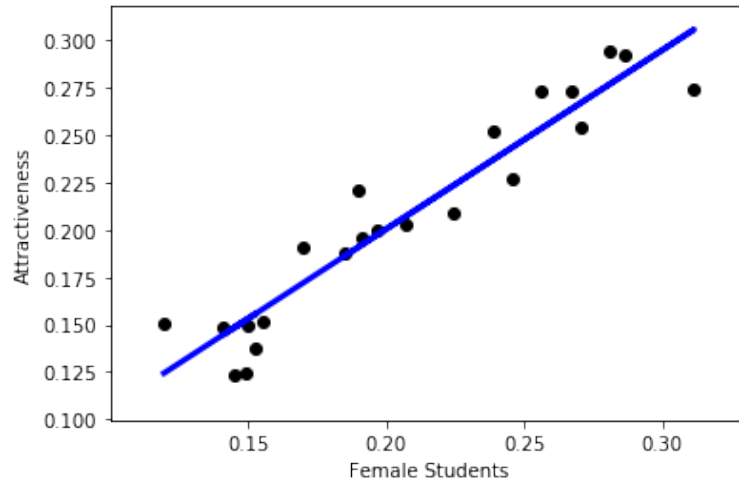


Figure 4.10: Single factor analysis: Female Students

$$Y = 0.9518 * X + 0.0099, R^2 = 0.9001 \quad (4.7)$$

Female students require access to more education opportunities to improve their occupational opportunities, living conditions and social status, as well as making a more significant contribution to economic development [78]. In the past 30 years, the Chinese economic situation has developed quickly, and it aims to have a positive influence on the gender gap, while good economic status means a good education system, improving the supply of schools and the ability of parents to send their children to schools [208]. Since 1980, the Chinese government has had a one-child policy, which means many girls are the only child in the family. In the past, the education opportunity in most families was taken by boys because of the traditional culture; however, because of the one-child policy, most families have no choice but to send their girls to the schools. Considering the problem of education returns, many families, especially rural families, prefer to send their girls to vocational schools. We can see from fig.4.10 and equation.4.7 the coefficient of determination is 0.9001 and the regression of coefficient is 0.9518, the factor the number of female students is an extremely strong positive factor. Considering the problem of education returns, many families especially many rural families they prefer to send their girls to the vocational schools. There are several reasons behind this phenomenon. In China, secondary vocational schools are free and have shorter schooling time. After graduation, students can work and earn money directly. For most rural families, the return on vocational education is more obviously visible.

Male students always have an advantage over female students in all kinds of education types and levels, especially in vocational education, since in the traditional vocational train-

maternal health; to combat HIV/AIDS, malaria, and other diseases; to ensure environmental sustainability; and to develop a global partnership for development.

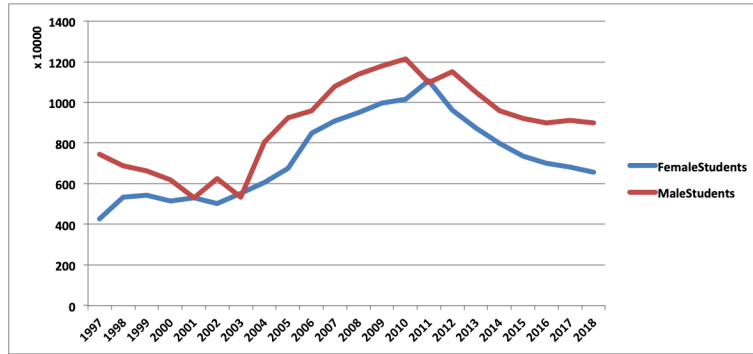


Figure 4.11: Single factor analysis: Male Students

$$Y = 0.8511 * X + 0.0322R^2 = 0.91439 \quad (4.8)$$

ing system, the core of apprenticeship was transferring skills to males rather than females in most majors. Against the background of Confucianism, there is a belief that too much learning does not become a woman, and females have only begun to be educated in China since the end of the last feudal dynasty, the Qing dynasty(around 1900). History and culture is the first reason why male students have more chances to attend vocational education and the second reason is the professional settings in most vocational schools. History and culture are the first reason why male students have more opportunities to attend vocational education. The second reason is the professional setting in most vocational schools. As we know, most majors in vocational schools are set to meet the requirements of the labour market. Most majors related to the manufacturing industry are set in vocational schools and, according to the Chinese Statistical Yearbook, 65.9% of labour in the market is male [121]. In fig.4.11 and equation.4.8, the number of R^2 equals to 0.91439 and the regression coefficient equals to 0.8511, the number of male students is another extremely strong positive factor. Terminal believes the gender gap in education has gradually narrowed and there is a trend that women will surpass men in the future [182]. We can see from the fig.4.12 that the gender gap between students has waved developed trend. For reasons such as the migration of the population and the one-child policy, the gender difference in the number of students shows a downward trend. However, with the development of the tertiary industry, females are the main workers in the commercial and service industry and males are the main workers in the manufacturing industry [121]. In other words, there is a new gender gap happening to some extent. In my research, both female and male students have a positive influence on the attractiveness of vocational education. The next step is to test which has more attractiveness.

A randomized experiment in India tested the hiring of additional teachers, especially female teachers, to improve education quality [8].The result was that by increasing the number of female teachers, the attendance rate of female students also increased, while there was no obvious influence on male students. One explanation is that girls in developing countries are

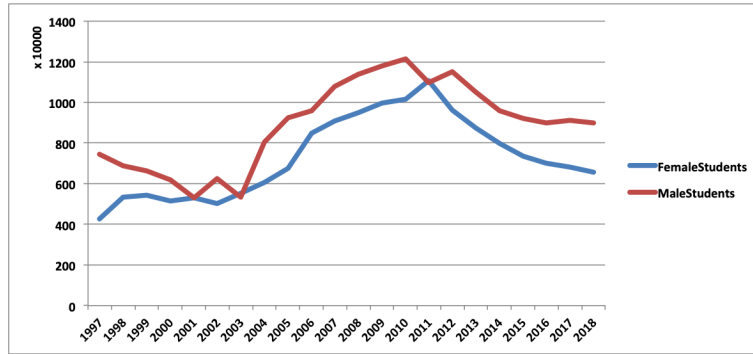


Figure 4.12: The number of Female vs. Male students in vocational schools in China 1997-2018

choosing whether or not to attend school, and they may be affected by role models in the form of female teachers [78]. In the given place and time, female teachers are believed to be more involved and more caring [1]. The biggest gender difference in vocational education is that most female students prefer to choose human and social service majors and most male students prefer to choose transport and technology majors [114]. In the secondary education period, caring duties were also discussed as a prerequisite for the whole profession, and woman had better performance than men on average in this kind of work [116]. In addition, most students in vocational schools have average school achievement and some have problems like low self-esteem: thus they need more caring from teachers. In fig. 4.13 and equation 4.9, the number of R^2 equals to 0.61173 and the regression coefficient equals to 0.4557, it is a strong positive factor. In China, the number of female teachers in vocational schools has a positive effect on students' choices; however, caring for young students is not the only reason those female teachers might do better. There may be other factors affecting students' preference.

Different from female teachers, the number of male teachers is an extremely weak negative factor according to the fig. 4.14 and equation 4.10 and the number of R^2 equals to 0.06896 and the regression coefficient equals to -0.1408. According to OECD data, in all OECD countries, around two-thirds of teachers from pre-school education to higher education are female, and the gender gap between primary and secondary education has increased, while in higher education the gap has narrowed [148]. Here we focus on secondary vocational education in China. The gap between the number of female and male teachers in vocational schools has narrowed and to become very similar (see fig. 4.15). There are several possible reasons for this situation. The first is that the average employment rate of women has increased recently: the increasing proportion of women in the labour market may have led to the 'feminization' of teaching in all schools. The second reason is the concept of special occupation: for example, in science research, there is a higher proportion of males, which may be caused by the social notion that the science field is a male-dominated one. The third reason may be economic. Compared with other highly educated workers, male teachers' average salary in secondary

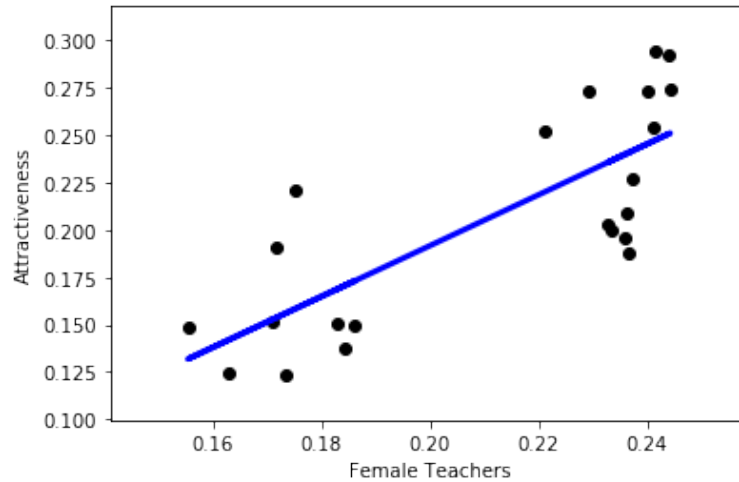


Figure 4.13: Single factor analysis: Female Teachers

$$Y = 0.4557 * X + 0.1169, R^2 = 0.61173 \quad (4.9)$$

education is 76% that of other male workers [148]. While female teachers can obtain a relatively high average salary compared with other female workers with a similar educational background. Compared with female teachers, male teachers offer lower attractiveness in vocational education, and even negative attractiveness is possible.

Gender preference has always influenced students' education choices, while the ethnic problem is not always an important factor in education results [183]. In China, there are 56 nationalities: the Han nationality and 55 ethnic minorities. Most ethnic minorities do not live in the centre of China, but have their own ethnic minority areas. In those areas, the level of economic development is relatively high, as the local government prefers to focus on economic rather than educational development. Furthermore, in most ethnic minority families, the parents do not have a good education level or good economic status, and minority students have a high rate of dropout in normal education. The development of vocational education is suitable for the local conditions. Many minority families send their children to vocational schools because they are free: all secondary vocational schools are free in China. Secondly, students can find a suitable job sooner after graduation compared with normal education. From fig 4.16 and equation 4.11 the number of R^2 equals to 0.33875 and the regression coefficient equals to 0.7031, the number of minority students is a weak positive factor. One possible explanation is that the development of local vocational education is at the beginning stage in China, and it may be a more long time before results are seen.

The number of minority teachers is also a factor which is assumed to have a relationship with the attractiveness of vocational education in this research. In the fig 4.17 and equa-

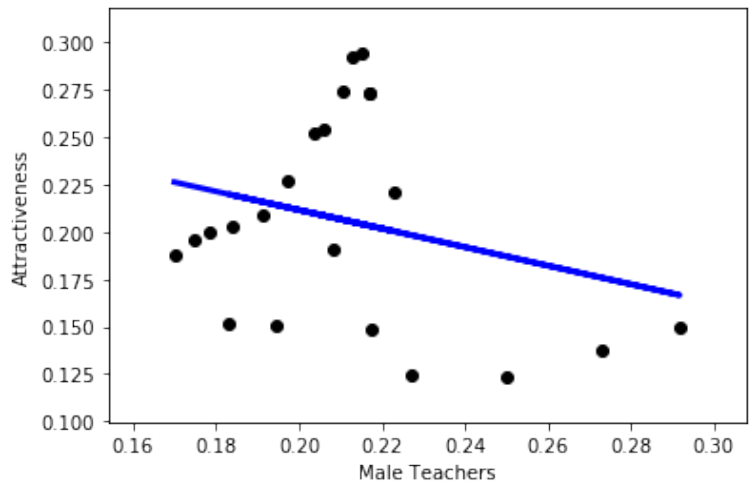


Figure 4.14: Single factor analysis: Male Teachers

$$Y = -0.1408 * X + 0.2402R^2 = 0.06896 \quad (4.10)$$

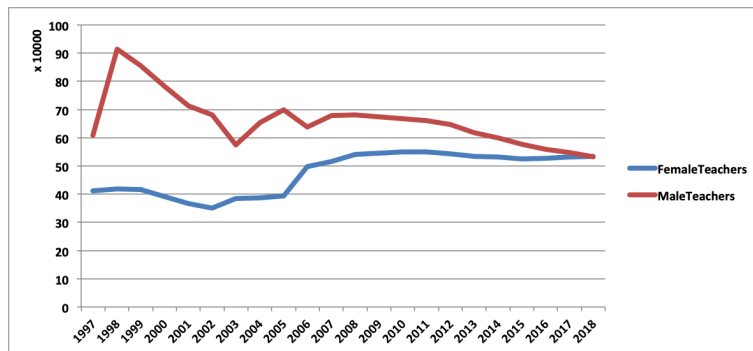


Figure 4.15: The number of Female vs. Male teachers in vocational schools in China 1997-2018

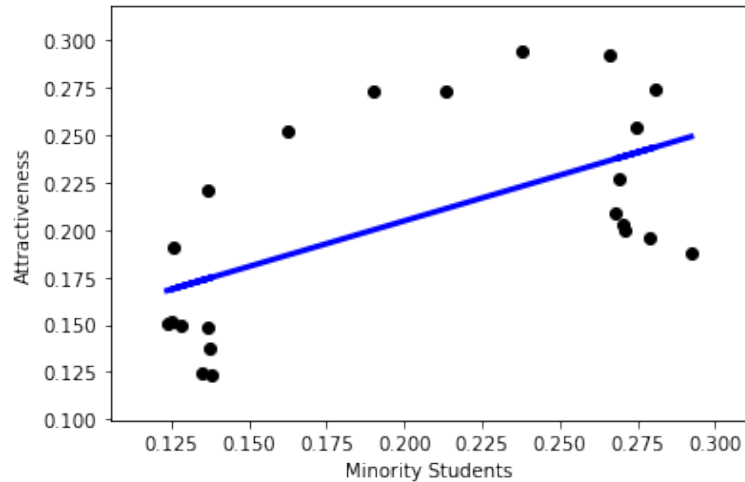


Figure 4.16: Single factor analysis: Minority Students

$$Y = 0.7031 * X + 0.0578, R^2 = 0.33875 \quad (4.11)$$

tion 4.12 the number of R^2 equals to 0.2913 and the regression coefficient equals to -0.1996, it is a weak negative factor. There is special policy support in China for minority students, whereby some normal universities recruit a certain number of minority students from every minority area every year. Those students could study in normal universities having scored lower than other students in the college entrance examination; at the same time, they will sign a contract with the universities that they will go back to work in their own minority areas after they graduate. Of course, they do not need to pay any fees during their time studying in the university. However, most minority students break the contract and prefer to find a job in big cities after graduating. The educational and economic environment cannot be dramatically improved in the minority areas in a short time: thus they have problems such as insufficient teachers and insufficient high-quality educational resources. If minority teachers come back to their home town to work, the next generation of minority students may think that if they choose education in this way they will also come back later. In this way, the attractiveness of education will be not high for them, and more minority teachers will attract fewer minority students.

Most students in the vocational education system are 15–24 years old [105] and the number of this population in the past 30 years has been steady, though slightly decreasing after 2010. However, it should be noted that the rate of youth unemployment has risen since 1997, as described in fig 4.18. One possible reason is the tightness of the labour market. Another possible reason is that there are a lot of skill mismatches among young workers. The kind of skilled talent trained in the education system may not be suited to the requirements of the labour market. What is more, because of the economic transformation and upgrading, a

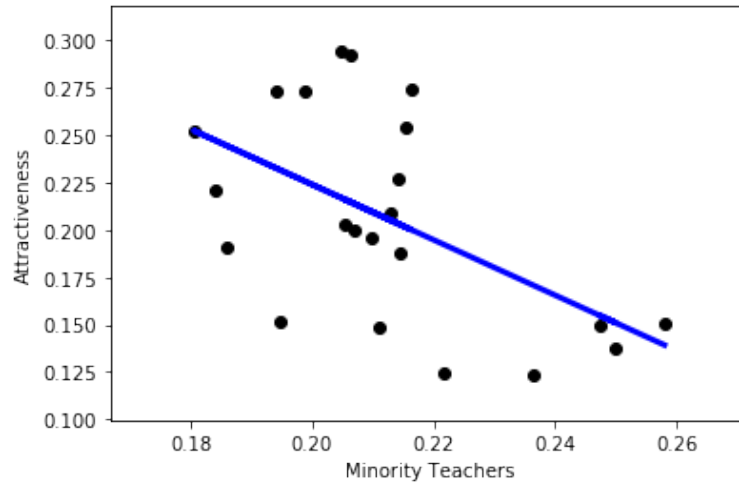


Figure 4.17: Single factor analysis: Minority Teachers

$$Y = -0.1996 * X7 + 0.2534, R^2 = 0.2913 \quad (4.12)$$

large number of rural labourers have transferred into urban areas in recent years [6]. Where rural labourers are parents, they generally prefer to send their children to vocational schools [91]: they do not have enough educational experience and economic ability to invest in normal education for their children. From Fig.4.19 and Equation.4.13, the number of R^2 equals to 0.35001 and the regression coefficient equals to 0.2161, the number of population 15-24 has a weak positive coefficient relationship with the attractiveness. One interpretation is that demographic movement has brought diversity of the population. The social phenomenon which is deeply influenced by Confucianism and is prejudiced against vocational education has changed a little, and both the government and some parents encourage more school-aged students to choose vocational education. Vocational education is a good measure to adjust the supply-demand balance in the labour market and make up for the labour shortage resulting from too many retired workers.

Increasing the number of vocational schools is a key way to prevent social exclusion [116]. The number of secondary schools has decreased by 44.9% (from 18,585 to 10,229) in the past 30 years. As mentioned before, the educational resources in vocational schools cannot compare with normal schools, and the government decided to shut down some vocational schools with lower teaching quality. As a result, they could concentrate the education resources to improve education quality and attract more students to vocational schools. According to the fig.4.20 and equation.4.14 the R^2 equals to 0.07734 and the regression coefficient equals to -0.1775, it is an extremely weak negative factor. While the development trend fits with the Chinese government's target by decreasing the number of vocational schools to attract higher enrolment. In other words, the number of vocational schools has no correlation

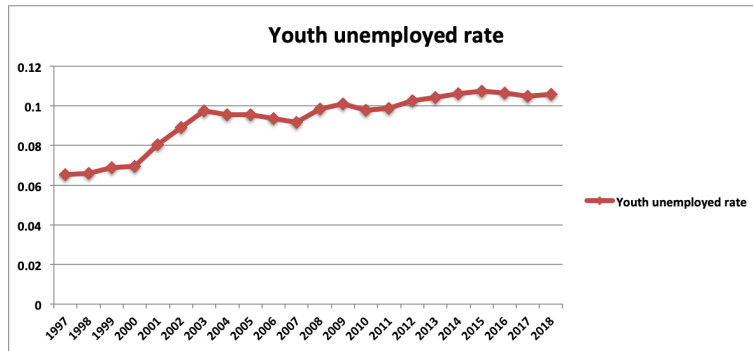


Figure 4.18: Youth unemployment rate in China 1997-2018

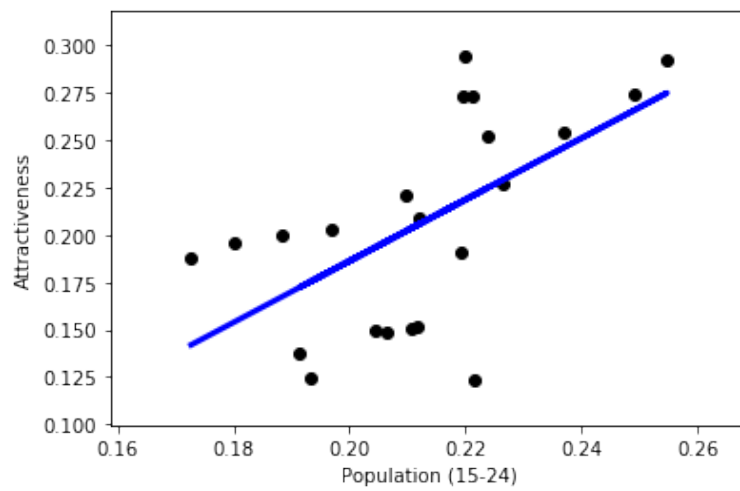


Figure 4.19: Single factor analysis: Population 15-24

$$Y = 0.2161 * X + 0.1677, R^2 = 0.35001 \quad (4.13)$$

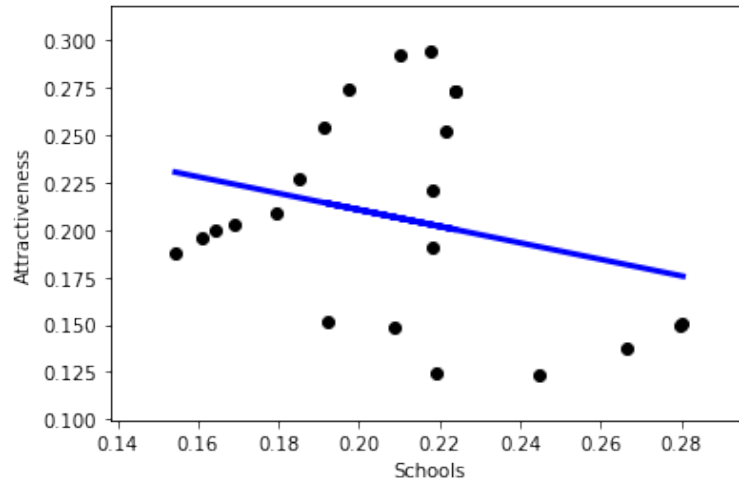


Figure 4.20: Single factor analysis: Schools

$$Y = -0.1775 * X + 0.2469, R^2 = 0.07734 \quad (4.14)$$

with the attractiveness of vocational schools. There is also an assumption that if vocational schools are not attractive, there will not be enough students entering vocational schools in the future and the number of vocational schools will further decrease.

Many research articles point out that an obvious problem in the Chinese vocational education system is the shortage of full-time teachers [161]. Existing problems are not only the lack of numbers, but also the unreasonable structure and the weak professional abilities among teachers. High-quality teachers generally means high-quality education, which could attract more students. Full-time teachers in vocational schools are mainly responsible for teaching and, in comparison with part-time teachers, are mainly responsible for the management. In China, unlike the dual vocational education system in Germany, students spend most if not all of their time in the vocational schools. When vocational teachers are teaching a vocational subject, it is different from teaching a theoretical subject [65]. They should have the professional ability of theoretical knowledge and practical experience related to the occupations they teach [65]. They are known as double qualified teachers in China: according to Chinese Ministry of Education data, in 2019 the number of double qualified teachers was 264,000, being 31.5% of the number of full-time teachers in secondary vocational schools. If the number of double qualified teachers continues to increase, the number of full-time teachers could be increased and the general level of vocational teachers' quality could also be increased. From Fig.4.21 and equation.4.15, the R^2 equals to 0.5324 and the regression coefficient equals to 0.3808, this factor full-time teachers is a medium positive one. In China, increasing the number of full-time and double qualified vocational teachers is necessary and urgent. From the supply-side perspective, there are 37 universities recruiting undergraduates whose majors are

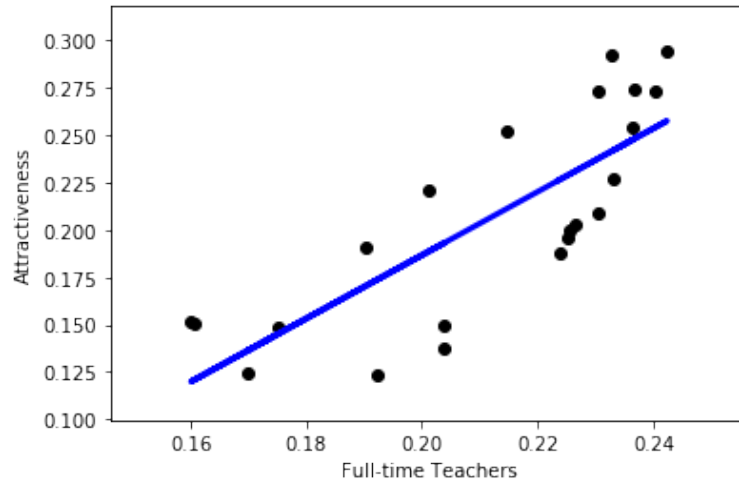


Figure 4.21: Single factor analysis: Full-time Teachers

$$Y = 0.3808 * X + 0.1328, R^2 = 0.5324 \quad (4.15)$$

in VET; 49 universities are recruiting Master's students, and the number of related majors is around 150. As a result, every year the number of cultivated vocational teachers is more than 20,000, and this number will continue to go up in the coming years. More full-time vocational teachers will attract more students to choose vocational education, while more students will also need more vocational teachers, which suggests a positive cycle.

Other staff in vocational schools are different from full-time teachers, and they are responsible for work other than teaching to allow the school to operate normally. However, some vocational schools are recruiting new staff to make up the shortage of full-time teachers in schools, and those staff are not good at teaching knowledge and leading practice [88]. Other staff normally include administration staff and part-time teachers in vocational schools. A problem with part-time teachers is that they are not as stable as full-time teachers. They cannot guarantee continuity of teaching, especially long-term teaching; at the same time, part-time teachers' assessment is lacking [88]. We can see from fig 4.22 and equation 4.16, the R^2 equals to 0.26931 and the regression coefficient equals to -0.4859, thus it has a weak negative influence on the attractiveness of vocational education. Recruiting more full-time teachers could guarantee the teaching quality in vocational schools and could attract more students. In the past 30 years, the difference between the number of full-time teachers and other staff in vocational schools has increased based on fig 4.23. A certain number of administrative staff is necessary to ensure the smooth operation of vocational schools, while the number of part-time teachers could be decreased, instead increasing the number of full-time teachers.

Every year, the graduation rate in vocational schools is significant for students. Under the

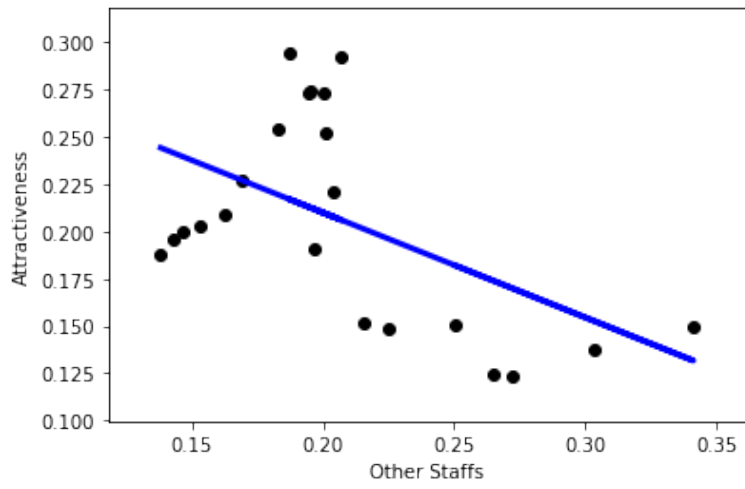


Figure 4.22: Single factor analysis: Other Staffs

$$Y = -0.4859 * X + 0.3071, R^2 = 0.26931 \quad (4.16)$$

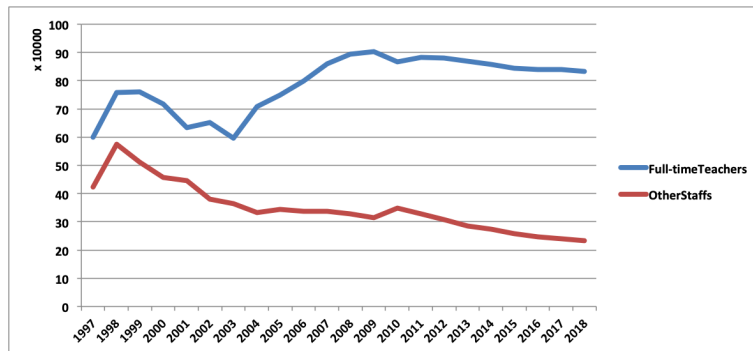


Figure 4.23: The number of Full-time teachers vs. Other staffs in vocational schools in China 1997-2018

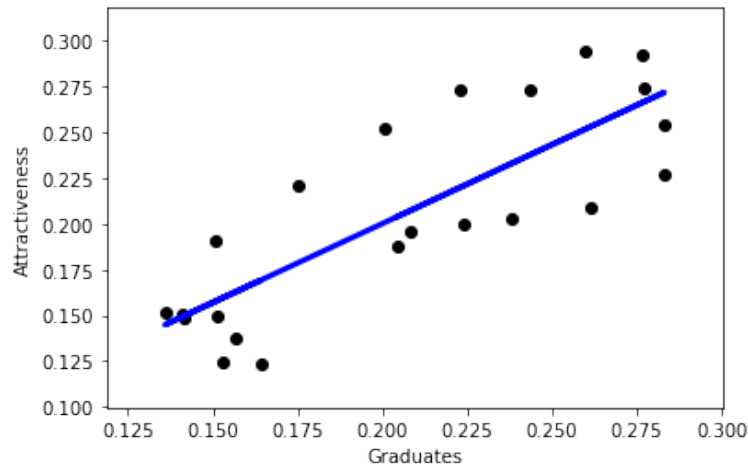


Figure 4.24: Single factor analysis: Graduates

$$Y = 0.765 * X + 0.0492, R^2 = 0.66022 \quad (4.17)$$

precondition of graduation, students can choose to find a job or pursue higher education. Recently, the division between vocational education and normal education has been based mainly on the high school entrance and college entrance examinations, and the most evaluation standard is school achievement. Students who are in vocational schools may not be good at studying and may worry about the graduation problem. When the graduation rate in vocational schools is high, it could mean that the graduating standard is not only academic achievement but also other aspects like practical experience. A high graduation rate will attract students to believe that that could get a good result from studying in vocational schools even they are not good at learning theoretical knowledge. From fig 4.24 and equation 4.17 we can see that R^2 equals to 0.66022 and the regression coefficient equals to 0.765. Thus the number of graduates in vocational schools is a strong positive factor: more graduates will attract more new enrolees. Students in vocational schools are generally those who are not good at academic study: they could choose to find a job directly in the labour market after the examinations. One reason may be that they have no confidence in the coming study, and a high graduation rate in vocational schools may attract them and make them believe that they can accomplish it.

To sum up, this previous research states some related factors based on the literature, and it is assumed that those factors could influence the attractiveness of vocational education. Linear regression analysis is used to test every factor to ascertain whether they have a coefficient relationship with the independent variable. Every separate analysis is under the precondition of the assumption that only this factor could affect the attractiveness. Based on the single factor analysis, the research can then move to the next step, multiple-factors analysis.

4.4.2 MULTIPLY FACTORS ANALYSIS

After the single-factor regression analysis, some factors could be singled out, such as those about teachers having a deep influence on the attractiveness of vocational education in China.

- The gender gap about teachers is the first point. According to the data analysis, female teachers have a stronger positive influence than male teachers, who have an extremely weak negative influence on the attractiveness of vocational education. More female teachers could increase the percentage of women working in the labour market and could set a positive example for the next female generation. One reason that could be considered is that male labourers prefer to find job positions other than work in vocational schools, where the average salary is normally lower than for other males who have a similar educational background.
- Another point about teachers is the job responsibilities of different types of teacher. Full-time teachers in vocational schools usually focus on teaching and have regular professional training and assessment. They have better progression pathways to improve their working abilities than part-time teachers. Compared with other staff in vocational schools, they should be more attractive to students.
- The rate of graduation in vocational schools is also a factor in attractiveness. The single-factor analysis showed that more graduates will attract more new enrollees.
- At the beginning of the single-factor regression analysis, the employed labour force in different industries was checked, and only the labour force in the secondary sector had a strong positive relationship with the dependent variable.
- The youth unemployment rate is a very important independent variable, because the direct target of some students who choose vocational education is to find a suitable job after graduating. The age range for youth employment is the same as the research population in this thesis, ranging from 15 to 24.
- In addition to the youth unemployment rate, other useful data relate to the population aged 15–24. The gender difference in the population is also a research question, addressing whether the female or the male population aged 15–24 is more likely to choose vocational education.
- In addition, the factor of female and male students has quite a strong positive correlation with attractiveness. With this in mind, the attractiveness data relates to the number of new enrolments in vocational schools, and it coincides with the number of students to some extent. Thus those two factors are not considered in the following multiple-factor regression analysis.

All factors are under the assumption that they are the only factor related to attractiveness, and the research purpose is to determine whether they are associated or not. The next step is to conduct multiple-factor analysis to figure out which factors are the most positive and most negative.

Table 4.2: OLS Regression Results in China

	un-std coef	std err	std coef	t	P> t	[0.025	0.0975]
Intercept	-1.132e+07	3.76e+06	1.18e-16	-3.015	0.010	-1.94e+07	-3.21e+06
Full-time teachers	6.210	2.445	0.276	2.540	0.025	0.928	11.492
Other staffs	4.497	3.857	0.155	1.166	0.265	-3.835	12.830
Female teachers	14.493	3.680	0.711	3.938	0.002	6.543	22.443
Male teachers	-3.690	1.599	-0.120	-2.308	0.038	-7.145	-0.236
Graduates	-0.286	0.321	-0.216	-0.891	0.389	-0.979	0.407
Employed labour force 2	66.498	45.522	0.148	1.461	0.168	-31.846	164.841
Youth unemployed rate	5.186e+07	2.19e+07	0.437	2.367	0.034	4.52e+06	9.992e+07
Population female 15-24	0.365	0.062	2.124	5.851	0.000	0.230	0.499
Population male 15-24	-0.324	0.078	-1.713	-4.147	0.001	-0.493	-0.155

Firstly, we see from tab 4.2 that the value of Prob (F-statistic) equals 8.40e-08. This is quite small, at less than 0.05, which means the whole regression model makes sense. Nine independent variables are considered in total in this model, and six factors have P-values less than 0.05. Thus, in this regression model, there are six independent variables that correlate with the dependent variable: four of them are positive and two of them are negative.

- The strongest positive factor is the number of female teachers in vocational schools, where more female teachers in schools will attract more new enrollees to choose vocational education in China. Three possible points explain this situation. Firstly, an increasing number of females working in vocational schools means an increasing proportion of females in the labour market, and this can be seen as setting an example or leading the next generation of females to make a career plan. The history and culture of Chinese women having a right to work in the labour market is not long, and in the ancient period, the right to education and work was mainly the preserve of the male population. The workforce and women's ability to work should be faced and made good use of. Secondly, there is considered to be more empathy from female teachers. As we know, the most obvious way to distinguish students who choose vocational education or normal education is by academic achievement rather than students' interests. Some have no confidence in studying and they may have problems like low self-esteem. Compared with male teachers, female teachers usually have more empathy with students' psychological problems, not only focusing on teaching them [16]. This kind of caring work from female teachers could also attract more students, especially those who are not confident. Thirdly, there is the economic problem. As mentioned above, for male teachers in vocational schools, the average salary is around 30%

lower than other male workers who have a similar educational background, while for female teachers the average salary is about 10% less than the female workforce on average [148]. The average relative salary difference may increase the attractiveness for females to work in vocational schools. Furthermore, in China, working in schools is treated as one of the most stable positions for women, while the men are better at work offering challenges and innovations against the social culture and background.

- The second positive related factor is still about teachers and is the number of full-time teachers in vocational schools. There are a number of possible explanations to explain why, with the increasing number of full-time teachers, more students could also choose vocational schools. Firstly, the shortage of full-time teachers means an unbalanced structure of the teaching team. In other words, insufficient full-time teachers may not guarantee the teaching quality, and good teaching quality is one evaluation standard for the reputation of a vocational school. Secondly, corresponding to full-time teachers are part-time teachers. If the number of part-time teachers in vocational schools is increasing, it may give rise to questions about the teachers' professionalism. Part-time teachers spend less time on their teaching work and some of them even have no teaching qualification: they are invited from companies to share their practical experience with students and so make up the full-time teachers' shortcoming of being good at theoretical knowledge rather than transferring skills. The government is trying to cultivate and increase the number of double qualified teachers in vocational schools. Such teachers should be full-time teachers, because they must obtain the teaching qualifications and professional qualifications about the corresponding subject at the same time. Increasing the proportion of this new kind of full-time teacher in vocational schools is the Chinese government's policy, and it is also seen as a point to attract more students to choose vocational education.
- The third positive factor is the size of the female population aged 15 to 24. According to the analysis, in the past 20 years in China, vocational education has been more attractive to school-aged females than males. The first possible interpretation concerns the political cause. The one-child policy has increased the female percentage in the Chinese demographic. As this policy began in 1980, it offers a meaningful set of data for the female and male population aged from 15 to 24, as they are almost the first population affected by this policy. From the fig.4.25 the demographic gender is very weak and has expanded since 2011. Under this policy, more and more girls could have the same educational opportunity as boys in most families, and most parents spend their education investment on their only girl especially in urban areas. The first possible interpretation concerns the economic aspect. In China, all secondary vocational education is free. This is a very important point to attract more female students, especially in rural areas. In cities, the one-child policy has seen a good result, and most families have the ability to fund education: economics are less of a problem, which could affect people's choices. In rural areas, though, some families have more than one child in private and they generally have a worse economic situation than people living in urban areas. In

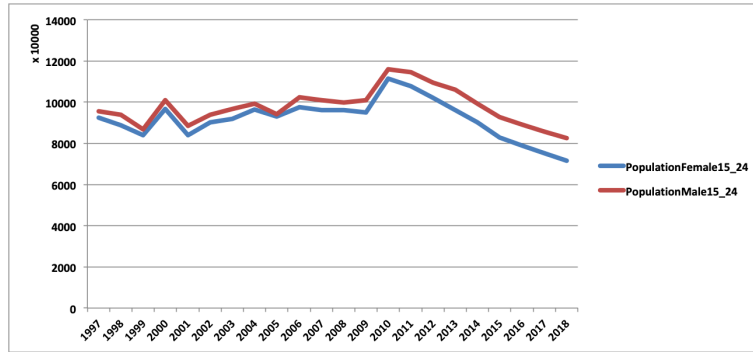


Figure 4.25: The number of female and male population 15-24 from 1997 to 2018 in China

those families, they prefer to invest in boys to go to school, mainly for cultural reasons. As a direct result, free vocational schools could be very attractive to make more students in rural areas, especially girls, choose vocational education. The third point is social. The Chinese culture has long been influenced by the Confucian culture, which believes that too much learning does not become a woman. Chinese women were not allowed or encouraged to be educated in schools and work in the labour market in ancient times. Of course, in modern society, this concept has changed, and against the background of the theory of human capital development, we know females have the right to be educated and find a job rather than always taking care of their family. Vocational education is a good choice for the female: they can work directly after graduation, and in most vocational schools they set up many majors which are suitable for women's development, such as job positions in the service industry.

- The fourth positive factor is the youth unemployment rate. Youth employment is a factor closely connected with the labour market. Larger youth unemployment means there is a supply and demand imbalance between education and the labour market. Compared with normal education, vocational education has a more direct target trained on the requirement of the labour market, and some majors in vocational schools even have a contract with companies. This is called order-type vocational education in China, and under this type of education there is a higher employment rate.
- The two remaining factors are both negative factors. The first is the size of the male population aged 15–24. Unlike the school-aged female demographic, vocational education is less attractive to males. As mentioned before, female teachers can have an 'idol' effect on female students, and male teachers have the same function for male students. When male students take training courses with another male, they may feel safer, preferring to seek help from others and even be more willing to study [141]. Another possible problem is the setting of majors in vocational schools. In the past several years, the number of subjects related to the service industry has increased, including economics, accounting, marketing, hotel management and so on. Compared with the

manufacturing industry, the service industry is less attractive to male students. Though the demographic structure and traditional thinking have changed somewhat in modern society, in most families, if they have boys, they still prefer to spend the educational investment on academic education as far as possible. For most male students, when they first choose vocational education they are not adults: thus the choice may not actually relate to their interest, but may rather be affected by their teachers, social norms, parents and other factors.

- The last negative factor is the number of male teachers in vocational schools. For some male teachers, career planning could be seen as a motivation, and there is more possibility of a male teacher than a female teacher being the head teacher [35]. As the position of head in every school is more remote than the position of teacher, the number of male teachers is lower than the number of female teachers. Furthermore, being a male teacher may not be recognized and praised by friends because it is not a difficult thing [159], and the lack of male teachers is a global trend. In the Chinese situation, as we saw before, more and more females are choosing vocational education; thus they may tend to study with more female teachers. If the number of male teachers increases, the attractiveness for female students may decrease.

On the whole, according to the OLS regression model, the most positive factor is the female population aged 15–24, followed by female teachers, youth unemployment rate and full-time teachers. The most negative factor is the male population aged 15–24, followed by male teachers. Further conclusions will be drawn in the next section.

4.5 CONCLUSION

There are four sections in this chapter. The first introduces basic information about Chinese secondary vocational education, like the number of new entrants in vocational schools and universities, to show changes in the attractiveness of vocational education in the past 20 years. The second section is a literature review: it introduces the basic research model and some possible factors influencing the attractiveness of vocational education. At the end of this section, an adjusted research model is built to check every possible factor. The third section is about the research method; it mainly introduces the data source, the dependent variable and independent variables. The main research model is classical linear regression using OLS regression analysis. The fourth part analyses every factor in detail. It is divided into two steps: single-factor analysis and multiple-factor analysis. A summary of the analysis is presented.

The first result focuses on demographic changes in the past 20 years. According to the OLS regression results (see table 4.2), the most positive and negative factors related to the attractiveness of vocational education in China are the female and male populations aged 15 to 24, respectively. The one-child policy in the past 40 years has changed the structure of the Chinese demographic, especially increasing the birth rate of girls. Against this background, the female population aged 15 to 24 has increased, and in both rural and urban areas, girls have had more opportunities to attend schools than before. With the upgrade of industries' structure, more talent is needed in the tertiary sector, and in those industries females are more popular than males in China. In vocational schools, some majors have also been upgraded to meet changes in the labour market. It can be concluded that the policy was the first motivation to attract more female students to choose vocational education, because the demographic changed with the adjusted policy. In the past, female human resources were not made good use of; in modern society, the government should consider how to cultivate more female talent.

The second result concerns gender difference in China. It is an interesting result that female students and female teachers are both more attracted to vocational education than male students or male teachers. Working as a teacher in a vocational school is a model career to attract the next female generation and it tends to be stable. In vocational schools, there are more and more majors that are suitable for female students to find a job after graduation. For graduates from vocational schools, the difficult thing is not finding a job as much as development and promotion in work in the future. Faced with this point, male students prefer to focus more on career development than female students. Especially in some rural areas in China, female students have only obtained education and work opportunities in recent years; thus they care more about the career opportunity than about development or promotion in the future. It is a great change that vocational education provides more chances for female students to obtain education. The next step in the next generation will be fighting for equal education and working chances in the future.

The third result is about teachers. Both the quality and the number of teachers in vocational schools have an important influence on attractiveness to new entrants. Increasing the number of full-time or even double qualified teachers in vocational schools is not enough: the corresponding assessment and training should also be added. To improve the teaching skills of those teachers is urgent, and the government encourages and gives funding to support it. Some schools have tried to learn from the dual system in Germany and have recruited part-time teachers from companies: the problem is that most trainers have not been trained as teachers. Maybe they are good in practice but not good at teaching. Another aspect is the gender gap between teachers, where female teachers could give more care to students, particularly when more and more female students choose vocational education in China. For males, being a teacher in a vocational school is not a good choice, and there is a big gap for males not only in vocational schools but in all kinds of school. The shortage of full-time teachers or female teachers in China is a big problem: increasing the number of those teachers may also increase the attractiveness of vocational education.

The last result concerns the youth unemployment rate. A higher youth unemployment rate means there are more students that could not find a job in the labour market. Vocational education is always considered to be a good way to help students to obtain employment. For vocational students, the hard thing is not employment but career development. Choosing academic education may improve job competitiveness in the future. When faced with the high unemployment rate, vocational education is highly attractive. This does not mean that there is no need for vocational graduates to improve their competitiveness: if vocational education can provide more high-quality training and education, there should be more new entrants choosing it.

To sum up, the factors analysed above have influenced the attractiveness of vocational education in China and the results have been summarized according to the OLS regression model. However, there are still some factors which have been proved to relate to vocational education's attractiveness, like the funding for vocational schools and students, the average salary for students graduating from vocational schools and so on. Because of the incomplete data, these could not be used in my research model to test and verify whether they have the same functions in the Chinese case. This is one deficiency of this research. The next chapter will analyse the German case, because articles often propose that the Chinese government should learn from the successful German dual system. The research target in the next chapter is to figure out the correlated factors in the German vocational education system and to check whether the factors are similar to those in China, and what it means for Chinese learning if the factors are different.

5 FACTORS INFLUENCED ON THE ATTRACTIVENESS OF VOCATIONAL EDUCATION AND TRAINING IN GERMANY

5.1 INTRODUCTION

The German vocational education system is famous for its dual system. It is a collaboration between small and medium-sized enterprises and public vocational schools in Germany. Apprentices who sign dual contracts usually need to study in vocational schools to obtain theoretical knowledge and to work in a company to practise operation each week. This kind of education system is also supported by law. The 1969 Vocational Training Act (revised in 2005) is an important Act guaranteeing training for young Germans: it provides apprenticeships with state-recognized vocational training and, after the training is completed, a certificate is issued by the competent authority (the Chamber of Commerce and Industry or the Handicraft Association). Because of this dual system, the youth unemployment rate in Germany is relatively low and the skills level of employees is relatively high. In Europe, and around the world, awareness of high-quality VET is becoming more and more important.

In the past almost 20 years, the German economy was booming but then suffered a recession due to the global financial crisis. The labour market began to reduce, and youths suffered as the rate of the youth unemployment rate increased. In addition, demographic changes put new pressure on German society, and the ageing problem was serious. The number of youths in employment was less than the number of retired employees, which caused an imbalance between labour market supply and demand in Germany. At the same time, immigration was another social issue in Germany. Because of the problems of the lack of youth employment and the lower skills level of immigrants, increasing the attractiveness of vocational education became very important.

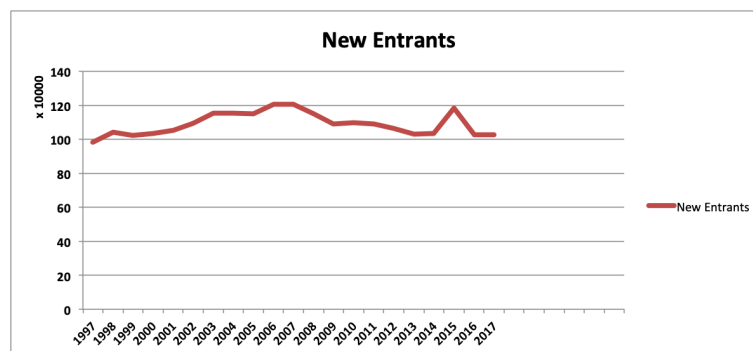


Figure 5.1: New entrants in all kinds of vocational schools in Germany 1997-2017

The fig 5.1 shows the new entrants in all kinds of vocational schools in Germany from 1997

to 2017. In the past 20 years, the number of new entrants in vocational schools has developed steadily with few obvious changes. While China and other countries are trying to improve the attractiveness of vocational education, German vocational schools have maintained a high level to attract a stable number of students. This chapter will analyse some factors in the attractiveness of vocational education in Germany and find which factors have influenced the enrolment rate in vocational schools and whether the factors have similar functions in China.

5.2 LITERATURE REVIEW

Students' college choice is used as the basic research model in this section. For the German situation, there are several other reasons why it is suitable.

- The first reason is that ideas about the market and customer-orientation have gradually spread in the German education market. The idea of education marketing comes from North America [93]. In the past, the topic of education marketing has been little discussed in Germany. One reason is that most kinds of school are funded by the government to a great extent. As German universities have obtained more and more autonomy in recent years, the competition between different universities is getting more and more fierce. Marketing and how to attract more and more high-quality students is becoming more and more important.
- Most research on students' decision-making when considering their college choice has been carried in America [146]. There are many factors which affect young teenagers' decisions about pursuing higher education, obtaining vocational education or choosing one career [139]. It is a complex interactive process, and youths may be influenced by, for example, parents' suggestions, schools' reputations, their own life experience or government funding. Many researchers, especially from the USA, have focused on analysing different factors influencing students' choice. However, few cases are related to the German situation. Thus the target of this chapter is to apply this model to the German education system and analyse the factors which may affect students' decisions.
- The well-established dual system of initial vocational training describes a learning programme that takes place in two places, and it seems to increase attention in the area of higher education(HE) [18]. In 2018/2019, there were 2.87 million new entrants to universities in Germany, while in vocational schools the number was around 1.2 million³⁵ In Germany, and in most countries around the world, higher education always had higher attractiveness than vocational education. The number of researches about higher education is far greater than the number about vocational education. Thus, learning from the research model for higher education in relation to vocational education is a possible research method.

Several aspects prove that this student choice model is suitable for German vocational schools and students. However, some factors need to be adjusted to meet the German case.

As we introduce in the previous chapter, the research model has three main parts: economic factors, social factors, and combined economic and social factors. According to the

³⁵The source comes from Statistisches Bundesamt (The Federal Statistical Office of Germany).

data collected from the German Statistical Yearbooks, the situation in Germany differs a little from the Chinese factors.

- It is said that the economic situation in a country has a direct influence on changes in education, especially in vocational education. Economic recession, especially after the financial crisis, may have increased the employment rate, particularly the youth unemployment rate, because many employers would choose to dismiss their employees. One main problem in the labour market is the mismatch between the skills youth offer and the ones employees need [142]. A high youth unemployment rate will lead to a decrease in GDP. In Germany, the dual system supplies many training positions for youths, and there is a labour balance between them (the number of positions and students).
- In Germany, tuition in almost all schools is free. Furthermore, students in vocational schools can obtain funding from the German government. Funding or scholarship in vocational schools is treated as an attraction to appeal to more students, especially those from poor families [71]. Vocational education, as the most direct way to learn skills and obtain a job position, with the guarantee of funding, offers students the possibility to maintain a livelihood and later obtain a junior professional qualification certificate.
- The employment demographic is another economic factor. Here, the research target is the youth employment population in Germany aged 15–25. The labour market has a close relationship with the economic situation. Economic recessions usually lead to tightening of the labour market, and tightening of the labour market will lead to a reduction in the labour force. Among the total labour force, youth employment is more likely to be dismissed, because youths lack working experience. Among youth employees, workers who have graduated from vocational schools are more likely to be dismissed than those from colleges, and the reason may be the low-quality educational background. Thus changes in the youth employment rate reflect the economic situation to some extent.

Economic factors always have an influence on all aspects of the development of vocational education. A better economic situation could allow enough funding to support the operation of vocational schools. At the same time, it could bring about a good labour market, which is the demand market, to accept youth employment. In this part, the collected German data concern the German GDP, the funding of vocational students, and the youth employment demographic in the labour market.

- A reason for the low youth unemployment rate in Germany given in many articles is the dual vocational education system. Unemployment is seen as a key socioeconomic indicator in the society, and in many countries youths aged from 15 to 24 are still in-

volved in education activities. In Germany, students can combine education with work under the dual system, and against the background of economic regression in the past, youth employment suffered almost no influence [30]. VET could be a positive method to help students transfer from schools to workplaces smoothly [55]. Thus it is said that the most effective way to ensure unsubsidized employment is to combine training with practical experience in the workplace [34]. In Germany, when students finish their dual training, they can enter the labour market faster and can therefore improve their salary level and stability of employment [2].

- The ageing population is not a social problem in just one country but is a global problem. Ageing will also bring the problem of a lack of labour force, and thus the youth population has a direct influence on the supply for youth employment in the labour market [30]. In the past 20 years, the youth population aged 15–25 in Germany has decreased by around 3.79% from 9.02 million to 8.68 million. This reflects a decline in the birth rate of the German population. Faced with the problem of a shortage in the working-age population, the German government has recently begun to pay attention to the vocational education policy for immigrants and descendants of immigrants.
- From 1997 to 2017, the number of foreign students in vocational schools increased by 29.85% from 228,000 to 325,000. Compared with local students, migrants' participation in VET is lower [181]. Youths with a migrant background often suffer the language problem and are influenced by their parents' social background, education level and career status. They have more opportunities not to choose higher education but to opt for vocational education [82]. At the same time, they compensate for the labour force shortage in the German labour market to a certain extent. However, the attractiveness for migrants seems to have fallen recently, especially among second-generation migrants [151]. Linear regression of the collected data will be used below to prove whether vocational education is still sufficiently attractive.

There are many social aspects that could be related to the attractiveness of vocational education in Germany. However, limited by the data which could be collected from the official database, this chapter picks up those three factors related to social problems in Germany. As many articles have mentioned, the dual system is a key factor leading to a lower German youth unemployment rate, and one research target is to test whether it really has a deep influence. Demographic changes in terms of the ageing problem or youth employment numbers both possibly bring about changes in the structure of the German labour market. Migration is another hot research topic, and it could be seen as a similar problem to the minority issues in the Chinese society.

- Teachers are an important part of the vocational education system, and it is believed that effective evaluation could improve teachers' teaching efficiency, thereby improving students' performance [180]. In vocational schools, there is a more complete eval-

uation standard and system for full-time teachers than for part-time teachers, as mentioned in the previous chapter. Thus full-time teachers should demonstrate higher teaching efficiency, and they have more opportunities to take part in further education and training. In addition, full-time teachers under usual conditions spend more time working than part-time teachers. If this assumption is true, more full-time teachers in vocational schools could attract more students. The gender gap is also thought to influence the attractiveness to students: female teachers may act as 'idols' for young girls. In the German case, because the data classification about teachers in vocational schools only refers to full-time and part-time teachers, there are no obvious data on gender differences. The later analysis will therefore only analyse the different functions of full-time and part-time teachers.

- According to the official data, in Germany from 1997 to 2017, the admission rate in all kinds of vocational schools increased by 4.25% and the graduation rate increased by 11.49%. The latter has developed around 63.04% than the former, which could prove that students in vocational schools are graduating more easily than before. This could attract students who may not be good at academic study. Examinations and theoretical learning are not the only evaluation standard in vocational schools: practical skills are another kind of score. In other words, vocational education has to some extent recognized the existence of different types of student. This is also a manifestation of the educational diversity in our society. We consider whether the changes in graduation rate in vocational schools could encourage more students to choose vocational education and, if it could, to what degree.
- For students in vocational schools, it is not a problem to find a job after graduation: the question is their competitiveness in terms of future career development. In the past, fewer graduates from initial vocational schools pursued higher education, while now, because of young students' ambition, the demand for high-level skills from the labour market and upskilling throughout life, pursuing higher level qualifications has become increasingly important among young students [67]. There is a natural pathway for academic education transfer into higher education, and it is also necessary and possible for vocational education to open a progression pathway including higher education and lifelong learning [67]. There is no need for students to graduate from vocational schools to pursue higher education later: if they aspire to do it, they should not have an unreasonable pathway. One advantage of the dual system in Germany is that it provides opportunities for students after graduation, whether they wish to work directly or pursue higher vocational education or higher academic education in the future.

Those factors are not solely economic or social problems, but are treated as a combination of both in this research. They have quite a close relationship with the attractiveness of vocational education in Germany. Teachers are an inevitable topic when researching vocational education, and a suitable teaching structure could improve teaching quality. As a result, stu-

dents' studying efficiency should also be increased. Graduation can be thought of as a sign of different evaluation standards for students, not only focusing on achievement. Some students choose vocational education because they are not good at academic study, while others may not be sure which education they want to choose and are just trying it out. When they graduate later, they should have an equal option to choose higher education or not. The pathways for vocational school graduates in Germany are diverse because there is a smooth transition system between different education types and levels, like the vocational education system and the higher education system, which recognize credit certifications from each other.

- The special part of Germany's vocational education system is the dual system. Different from full-time vocational schools, students will sign contracts with specific companies and those companies grant the qualification in vocational education and training. In 2017, the number of apprentices in the dual system was 1,323,894, having decreased by about 18.39% compared with 1997. Manufacturing accounts for nearly a quarter of the German economy, and the key element of its success is the dual vocational education system [207]. This provides a steady stream of high-quality industrial workers entering the labour market every year and helps Germany to maintain a reputation for producing top-quality products [207]. In the past 20 years, the number of apprentices has decreased a little, and this research aspires to verify whether the apprentices have an influence on vocational schools' attractiveness to new entrants.
- Every year, there are more than 500,000 new training contracts and completed contracts in the apprenticeship programme. In the previous 20 years, they have reduced by 11.44% and 13.74%, respectively [36]. Because every training contract has been different over the years, it is different to calculate the rate of completion by apprentices. At the same time, the number of completed contracts is higher than the number of new training contracts, which may be explained by more and more apprentices not being able to finish their vocational training in time. There are a lot of aspects to explain this situation: students may perceive lower training quality, a poor working environment or a wrong job description. Training companies may consider the problem to be the lack of qualified trainers. Some unions believe that apprentices with lower salaries may have higher dropout rates. Whatever the reason, the uncompleted contracts rate for apprentices has increased in recent years, and some new students may hesitate or not choose vocational education for those reasons.
- Apprentices' salary may be one reason for attracting students to choose VET. Using data from 1997 to 2017, the training allowance (Ausbildungsgeld) for apprentices has increased by 35.48% (from 2000 euro per month to 3100 euro per month). Some students who choose vocational education may do so because of their own interests, while

³⁶According to VET Data Report Germany [26], the training contracts decrease from 587,517 to 520,331 and the completed contracts decrease from 597,800 to 515,679 (1997-2017).

others may consider the salary level from the apprenticeship programme. The dual system in Germany provides a model for students who prefer to study and earn money at the same time. A training allowance is an incentive, especially for young apprentices, because it can be seen treated as recognition of their work and training. It can also improve the training completion rate for apprenticeship [176]. Furthermore, it may be an incentive for employers, encouraging them to hire more young apprentices and to see whether they might become qualified employees in the future [176].

The factors above are related to one part of the dual system, the training company, and it is the most distinctive feature of the German vocational education system compared with other countries' education system. The current apprentice number shows how many students are undergoing vocational training under the apprenticeship programme now, while completed contracts shows one kind of graduation rate for apprentices. Both figures have reduced by more than 10% in the past 20 years; the question is whether this influences the choices made by later students. Furthermore, the training allowance is an effective method to drive more young people and employers to take part in the vocational education system.

Combining the possible related factors in different articles and the data that could be collected in the official database, a research model is developed which is suitable for the German case, based on the students' college choice theory previously mentioned. In the fig.5.2 there are four main parts: economic factors, social factors, factors associated with both economic and social issues, and company factors. The first three aspects are similar to the original research model and the Chinese research model. The company aspect is unique in Germany. As many researches and reports state, the dual system is the key element in the success of the German vocational education system. Here, one research purpose is to find the relationship between the two different elements.

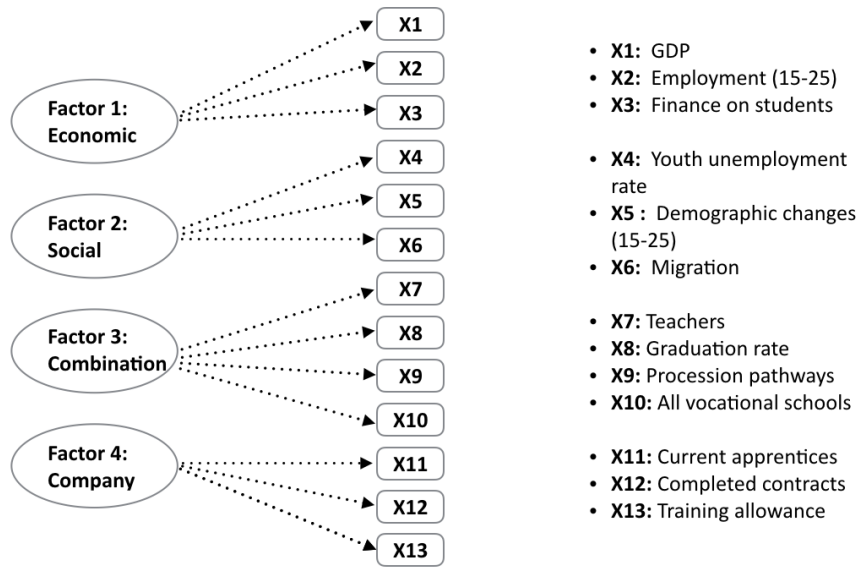


Figure 5.2: The model of factors influenced on the attractiveness of vocational education and training in Germany

5.3 METHODOLOGY

The main research method in this section is linear regression analysis, following which scatterplots and regression lines will show the relationships between the dependent and independent variables. In the German case, the dependent variable is the attractiveness of vocational education in Germany, and it is equal to the number of new entrants in all vocational schools divided by the number of students in the universities. All independent factors are based on the previous section and the literature review from 1997 to 2016. All data are collected from the official Statistical Yearbook for the Federal Republic of Germany and the VET Data Report Germany. Economic factors include GDP, the employed labour force aged 15–25, and finance for vocational students and apprentices. social factors include the youth unemployment rate, demographic changes in 15–25 year olds, and the number of foreign students in vocational schools. Combined factors include the number of graduates, the number of vocational schools, the number of full-time/part-time teachers, and the rate of continuing VET. Company factors include the current number of apprentices, the number of completed contracts and the training allowance.

The regression equations will also be one of the results; the formula is $Y = a + bx$ and the value of R-square. The first useful value is the coefficient of determination R-square, which represents the relevance of every factor; the second useful value is the regression coefficient b , which shows the positive or negative function of the dependent variable. Regression analyses are done for every single factor, the purpose being to pick up the real related factors. To see which is the most important factor among them, we need the second step, which is multiple-factor regression analysis.

Let us assume that all collected data are correlated with the attractiveness of VET in this research. After single-factor regression analysis, we will test and obtain the final result as to whether or not they really have influence. A list of the final related factors will be stated on which the second step, the multiple-factor regression analysis, will be based. The OLS regression outcome will be the final result in this section, and the total number of related factors and which are the most positive and negative factor will be shown in the following tables.

Under this analysis, the value of attractiveness of vocational education and training is set as the ratio of students in vocational schools and universities like the equation [5.1](#). Among it, Y is the attractiveness of VET, A is the number of students in vocational schools, B is the number of students in university and C is the number of students in the university of applied science. In addition, because of all numbers' range of numbers is too large and the units are different in this model, it is necessary to normalize all numbers to make the comparison's result more clear and easier to show in one graph. The normalized data is calculated based on the equation [5.2](#) and the tab. [5.1](#) and tab. [5.2](#) are the normalized tables.

After analysis, the factors influencing the attractiveness of vocational education in Ger-

many will be clear and possible explanations given. Above all, these are the research questions in this chapter.

$$Y = A/(B + C) \quad (5.1)$$

$$X_{new} = X - X_{min}/(X_{max} - X_{min}) \quad (5.2)$$

The research purpose of this paper is to analyze the factors influenced on the attractiveness of vocational education and training and provide data evidence. The research problems of this paper as follows

- The definition and measurement of the attractiveness of vocational education and training.
- The factors and classification of the attractiveness of vocational education and training.
- The linear regression analysis of all factors influenced on the the attractiveness of vocational education and training.

Table 5.1: Normalised German Data 1

Years	Attractiveness	GDP	Employment female 15-25	Employment male 15-25	Finance per student	Finance in dual system	Youth unemployment rate	Population 15-25
1997	0.254	0.163	0.213	0.224	0.189	0.186	0.252	0.219
1998	0.262	0.165	0.213	0.226	0.183	0.195	0.228	0.221
1999	0.273	0.161	0.223	0.233	0.189	0.186	0.213	0.223
2000	0.273	0.143	0.224	0.235	0.189	0.195	0.206	0.225
2001	0.265	0.143	0.230	0.234	0.189	0.195	0.203	0.228
2002	0.237	0.152	0.225	0.224	0.195	0.195	0.242	0.231
2003	0.230	0.183	0.225	0.221	0.189	0.205	0.269	0.234
2004	0.237	0.206	0.213	0.212	0.195	0.205	0.269	0.235
2005	0.235	0.209	0.222	0.223	0.207	0.205	0.274	0.236
2006	0.235	0.219	0.228	0.228	0.212	0.205	0.250	0.234
2007	0.241	0.251	0.235	0.237	0.213	0.205	0.211	0.231
2008	0.237	0.274	0.237	0.240	0.207	0.205	0.182	0.229
2009	0.224	0.250	0.234	0.229	0.225	0.223	0.266	0.225
2010	0.205	0.250	0.230	0.226	0.236	0.233	0.235	0.222
2011	0.187	0.275	0.237	0.229	0.242	0.242	0.206	0.215
2012	0.173	0.259	0.225	0.220	0.254	0.251	0.194	0.214
2013	0.163	0.274	0.225	0.220	0.266	0.260	0.189	0.212
2014	0.157	0.285	0.211	0.204	0.272	0.270	0.189	0.210
2015	0.152	0.247	0.207	0.198	0.278	0.279	0.174	0.213
2016	0.159	0.255	0.210	0.205	0.290	0.288	0.172	0.213

Table 5.2: Normalised German Data 2

Years	Attractiveness	Foreign students	Graduates	Full-time teachers	Part-time teachers	Schools	CVET ^a	Completed Contracts	Training Allowance
1997	0.254	0.240	0.191	0.235	0.157	0.233	0.158	0.233	0.186
1998	0.262	0.231	0.202	0.236	0.167	0.236	0.158	0.238	0.195
1999	0.273	0.225	0.204	0.223	0.170	0.233	0.259	0.247	0.186
2000	0.273	0.215	0.209	0.225	0.171	0.237	0.264	0.242	0.195
2001	0.265	0.211	0.215	0.224	0.183	0.237	0.261	0.237	0.195
2002	0.237	0.204	0.219	0.223	0.199	0.239	0.228	0.221	0.195
2003	0.230	0.203	0.229	0.225	0.207	0.214	0.208	0.220	0.205
2004	0.237	0.201	0.235	0.225	0.221	0.215	0.208	0.223	0.205
2005	0.235	0.198	0.233	0.226	0.228	0.206	0.228	0.218	0.205
2006	0.235	0.196	0.243	0.225	0.237	0.213	0.228	0.226	0.205
2007	0.241	0.199	0.246	0.224	0.238	0.218	0.237	0.243	0.205
2008	0.237	0.206	0.243	0.221	0.245	0.218	0.243	0.237	0.205
2009	0.224	0.213	0.240	0.220	0.254	0.217	0.231	0.219	0.223
2010	0.205	0.216	0.241	0.219	0.260	0.216	0.233	0.218	0.233
2011	0.187	0.217	0.235	0.221	0.254	0.216	0.228	0.220	0.242
2012	0.173	0.217	0.224	0.217	0.252	0.215	0.221	0.214	0.251
2013	0.163	0.222	0.216	0.219	0.244	0.215	0.221	0.205	0.260
2014	0.157	0.232	0.214	0.219	0.241	0.215	0.213	0.202	0.270
2015	0.152	0.264	0.207	0.220	0.242	0.214	0.207	0.201	0.279
2016	0.159	0.325	0.216	0.223	0.252	0.258	0.204	0.199	0.288

^aContinuing Vocational Education and Training

5.4 ANALYSIS

5.4.1 SINGER FACTOR ANALYSIS

As mentioned in the literature review, the economic situation in a country might have a direct negative influence on the attractiveness of vocational education, and this view is verified here. According to the fig.5.3 and the equation.5.3 the number of R^2 equals 0.62087 and the number of the regression coefficient is -0.9625. Thus the first factor GDP is a strongly negative indicator. VET is treated as an effective way to promote economic growth because it provides individuals with skills which have advantages for the workplace [145], because those skills could have immediate effects on productivity, also enhancing the economy [145]. While the GDP is high, more students might change to choose academic education as they have no need to choose vocational education for survival. In the financial crisis, the attractiveness of vocational education increased and most teenagers would choose one skill to learn to move smoothly to employment after graduation.

The fig.5.4 and the equation.5.4 reflect the relationship between the employment female from 15 to 25. The number of all employed females in the labour market is based on the youth population, divided into two age brackets: 15–20 and 20–25. The number of R^2 equals 0.0696 and the number of the regression coefficient is 0.0602, so it has extreme weak relation with the attractiveness. Compared with the situation in developing countries, the gap between rich and poor is not so big in Germany, and both male and female students have the right to be educated in schools. In Germany, there are many male-dominated careers re-

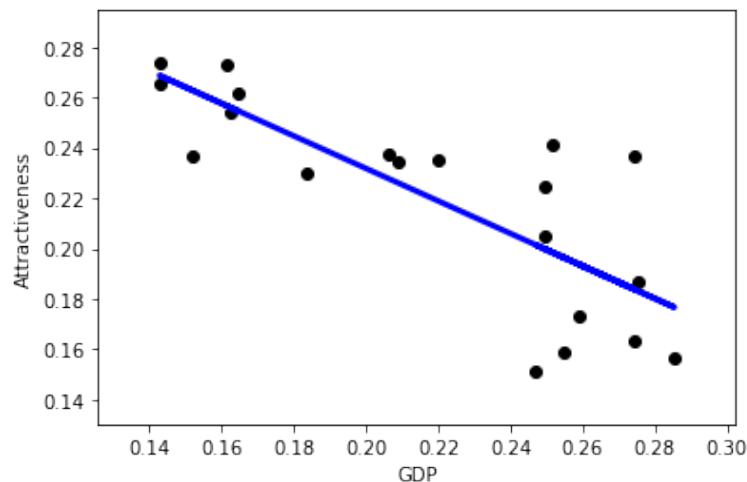


Figure 5.3: Single factor analysis: GDP in Germany from 1997 to 2017

$$Y = -0.9625 * X + 0.43, R^2 = 0.62087 \quad (5.3)$$

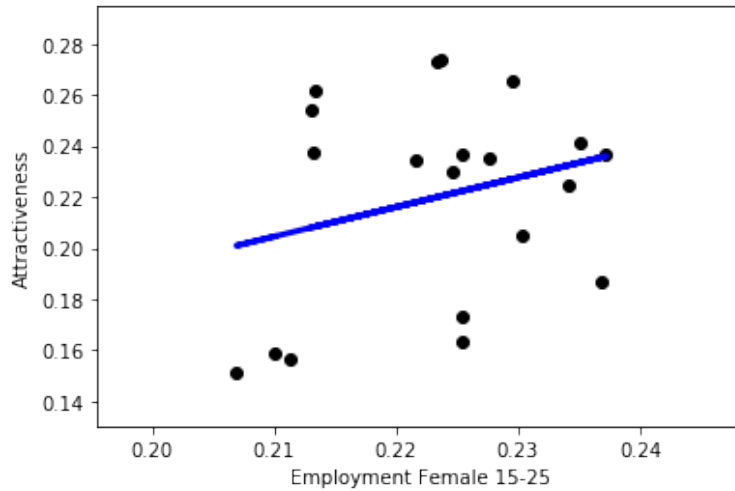


Figure 5.4: Single factor analysis: Employment Female 15-25

$$Y = 0.0602 * X + 0.2102, R^2 = 0.0696 \quad (5.4)$$

lated to manufacturing, industry and commercial fields, and those majors dominate in the VET [90]. Because of the professional settings in the dual system, females' chance is less than males'. Even though in modern society women have more opportunity to work outside, they still tend to take on more family responsibility than males [27].

We can see from fig 5.6, male youth employment in the German labour market is always higher than female. Although the participation of females in the labour market has increased steadily in the past decades, there is still a difference in the participation of men and women in the labour market [196]. One possible reason is that the male breadwinner model³⁷ is popular in Germany [90], which results in the high demand for the male to find a job in the labour market. According to the fig 5.5 and the equation 5.5, the number of R square is 0.53641 and the number of the regression coefficient is 0.2019, thus it is a medium positive factor to attract more students to choose vocational education. The structure and demands of the labour market have led to the professional settings of vocational schools, and the settings have led to the percentage of male and female students in the dual system. In other words, Germany is a major manufacturing country. Naturally, there are many majors in manufacturing, industry and commerce in vocational schools, and these majors are dominated by men. Thus, in Germany, males are more likely than females to choose vocational education.

In Germany, there are three entities contributing finance for vocational education and

³⁷The breadwinner model is a paradigm of family centred on a breadwinner, "the member of a family who earns the money to support the others". [135]

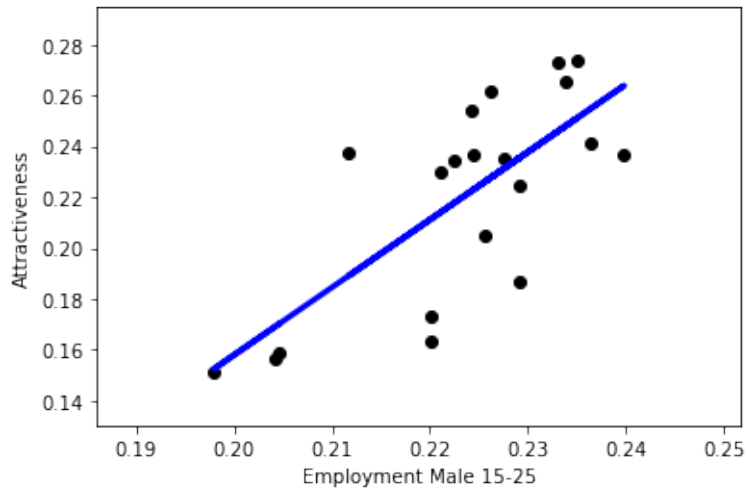


Figure 5.5: Single factor analysis: Employment Male 15-25

$$Y = 0.2019 * X + 0.1789, R^2 = 0.53641 \quad (5.5)$$

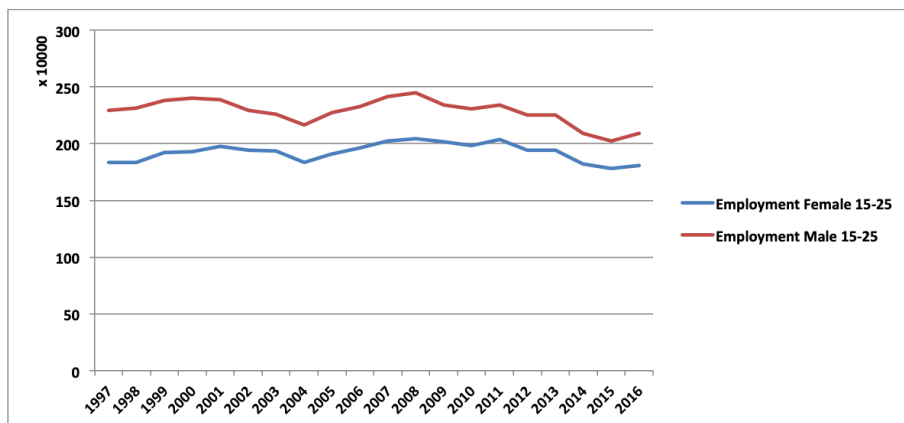


Figure 5.6: Youth employment labour force in the German labour market

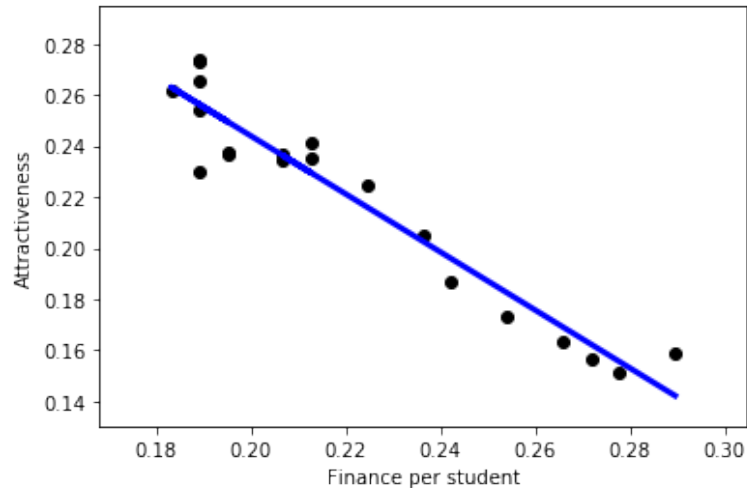


Figure 5.7: Single factor analysis: Finance on per student in vocational schools

$$Y = -2189.9 * X + 6766.4, R^2 = 0.9224 \quad (5.6)$$

training: the companies, the public sector and the trainees themselves [143]. The public sector includes the Federal Government, federal states and Bundesagentur für Arbeit (BA) (Federal Employment Agency) and funding from the public sector is used not only for the dual system but also for vocational schools [143]. The two indicators below are finance from the public sector for every student in vocational school and in the dual system in the past 20 years. In fig.5.7 and equation.5.6, the number of R square is 0.9224 and the regression coefficient is -2189.9 and in fig.5.8 and equation.5.7 the number of R square is 0.93354 and the regression coefficient is -1313.1. Combined with the two scatterplots, these two factors have similar influence and are extremely strong negative factors. While financial support is always limited, and with the increasing participation of individuals in the vocational education system, the money may not be sufficient for everyone to survive. Thus we can speculate from from the fig.5.9, the finance has increased over the years and, as a result, the number of students participating in VET has decreased. Increasing financial support is always necessary when developing VET.

When talking about the dual system in Germany, the first idea that emerges is that it leads to a lower youth unemployment rate in the labour market. In Germany, if a youth wishes to enter the labour market, they have to be trained first [112]. If the dual system brings about a low youth unemployment rate in Germany, it may lead to high attractiveness of VET. From the fig.5.10 and the equation.5.8, the number of R^2 equals 0.24898 and the number of the regression coefficient equals 0.0271. Thus it shows the youth unemployment rate is a weak positive indicator. There are many reasons related to the favourable youth unemployment rate in Germany, like the beneficial economic situation, the youth employment advisory ser-

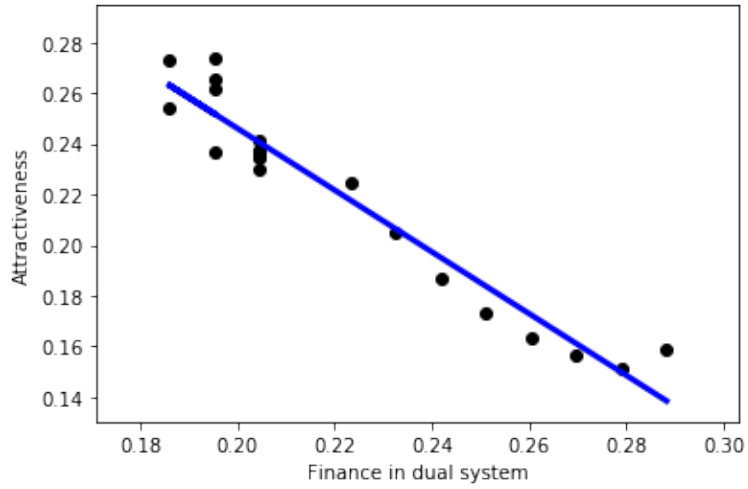


Figure 5.8: Single factor analysis: Finance on per student in dual system

$$Y = -1313.1 * X + 4194.7, R^2 = 0.93354 \quad (5.7)$$

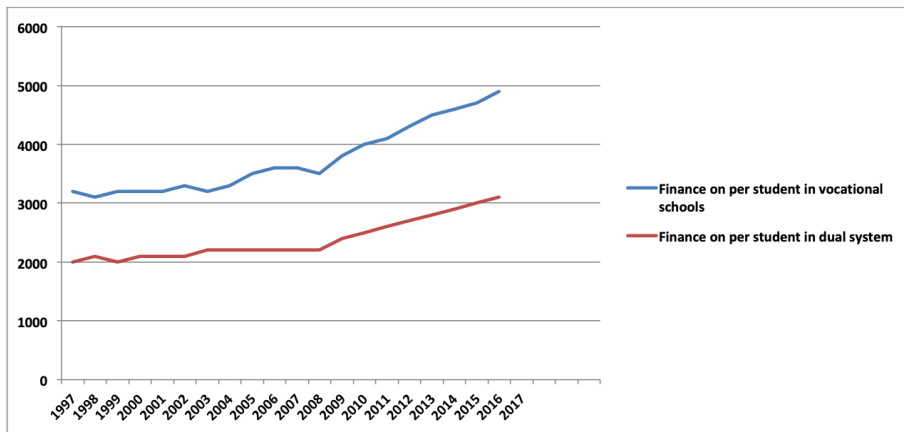


Figure 5.9: Finance on per student in vocational schools and in the dual system from 1997 to 2017

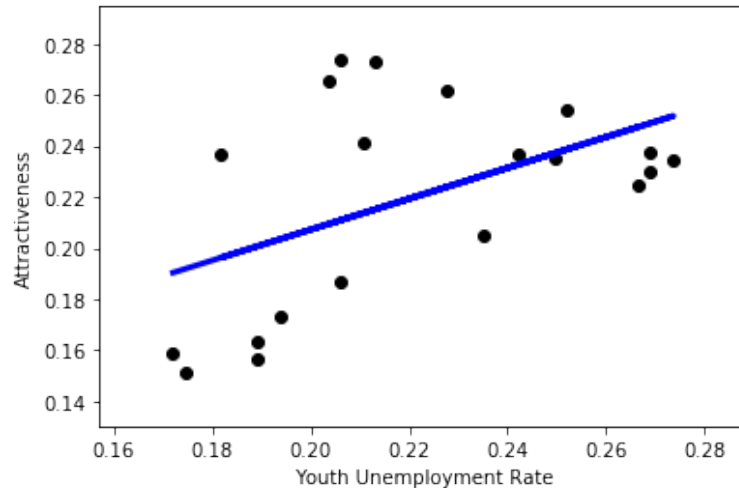


Figure 5.10: Single factor analysis: Youth Unemployment Rate in Germany 1997-2017

$$Y = 0.0271 * X + 0.0538, R^2 = 0.24898 \quad (5.8)$$

vices” (Jugendberufsagenturen) and of course the well-established system of dual vocational training. The advantage transition process is the successful key helps youth from schools to employment.

The ageing population in Germany increased to around 28.5 % of the whole population in 2019³⁸. Demographic changes have brought a shortage in employment, and there is a higher demand for a working-age labour force for the labour market. The population aged 15–25 might be seen as a supplement of suitably skilled workers in the future. At the same time, VET educates in skills that can easily be transferred into the workplace, because the individuals have been trained in real skills. Based on the fig.5.11 and the equation.5.9 the number of R square is 0.48838 and the regression coefficient is 0.1461, thus it has a medium positive influence on the attractiveness of VET in Germany. As more school-aged students enter vocational schools, it could solve the labour shortage problem to some extent, while also having an ‘idol’ function for the next generation. More and more teenagers are able to find a job after graduating from vocational education. Of course, younger individuals might consider more in the future. In Germany, the birth rate is very low and the government has begun to receive a large foreign labour force to increase the number of suitable labourers.

With the demographic problem that every year the number of labourers leaving the labour market is higher than the number of labourers entering the labour market, there is a serious shortage of highly skilled talent in the German labour market. Because of the good reputation

³⁸Data comes from ‘Statistisches Bundesamt’ and the aging population is people who ages over 60 years old

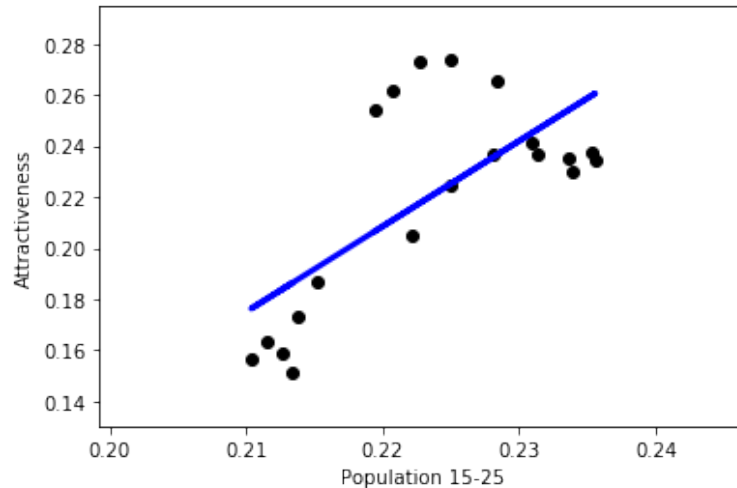


Figure 5.11: Single factor analysis: Population 15-25 in Germany 1997-2017

$$Y = 0.1461 * X + 0.1913, R^2 = 0.48838 \quad (5.9)$$

of the dual system in Germany, more and more foreign students, including immigrants, are choosing vocational education. With the participation of foreign students in the dual system increasing, more and more local students are going to universities. One possible reason may be the lower salary of graduates from vocational education compared with those graduating from higher education; another possible explanation might be self-esteem, whereby local students have more self-belief than foreign students studying in the dual system. Furthermore, because of the language problem or other issues, foreign students may not be good at study, and it seems that vocational education is the chosen place for students who have lower schooling achievement. In fig.5.12 and the equation 5.10, the number of R square equals to 0.25136 and the regression coefficient equals to -0.3603, the number of foreign students has a weak negative influence on the attractiveness of vocational education.

This factor describes the relationship between attractiveness and the number of graduates in all vocational schools. The fig.5.13 and the equation 5.11 shows the R square is 0.00342 and the regression coefficient is -0.0229. It is an extremely weak indicator, in another word more graduates might lead to less attractiveness of VET. One possible explanation is that more graduates may mean it is not difficult to achieve certification in vocational education. Other individuals might consider whether this certification is worth obtaining and how much value it has in the labour market. If it is easier to study, then most teenagers could study in vocational schools. This is just speculation, because based on the regression result they almost have no relationship. This hypothesis is also relevant to China: in the previous chapter, graduation rate was a weak negative factor.

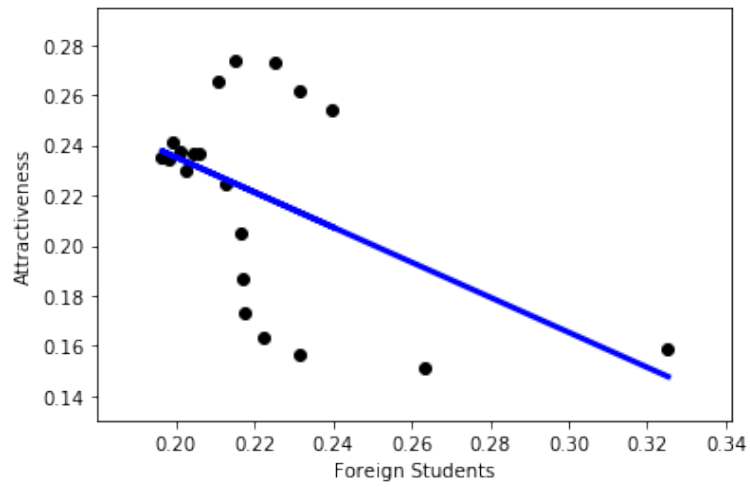


Figure 5.12: Single factor analysis: Foreign Students in Germany 1997-2017

$$Y = -0.3603 * X + 0.301, R^2 = 0.25136 \quad (5.10)$$

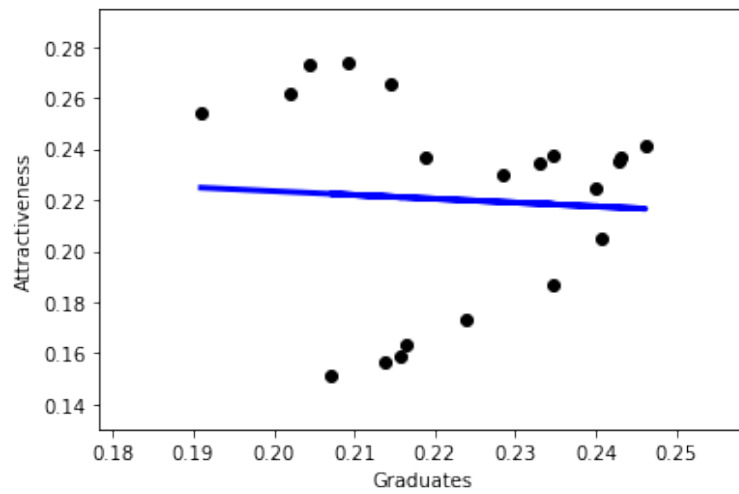


Figure 5.13: Single factor analysis: Graduates in vocational schools in Germany 1997-2017

$$Y = -0.0229 * X + 0.2281, R^2 = 0.00342 \quad (5.11)$$

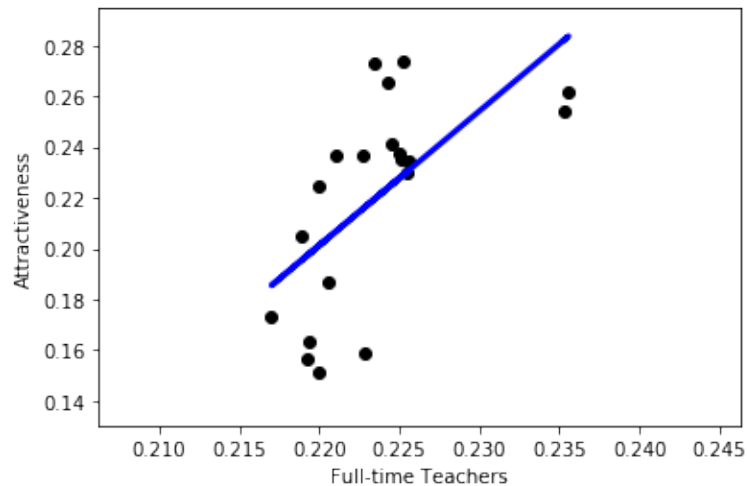


Figure 5.14: Single factor analysis: Full-time teachers in vocational schools in Germany 1997-2017

$$Y = 0.0734 * X + 0.2074, R^2 = 0.38846 \quad (5.12)$$

In Germany, for family reasons, teachers can choose to work full-time or part-time, and as part-time teachers, they should have at least 50% of the full working hours. Compared with the fig.5.14 and the fig.5.15, the equation.5.12 and the equation.5.13 the number of R^2 for full-time teachers equal 0.38846 and the number of the regression coefficient equals 0.0734 and the number of R^2 for part-time teachers equals 0.55395 and the number of the regression coefficient equals -0.6274. The number of full-time teachers in vocational schools has a weak positive influence, while the number of part-time teachers has a medium negative influence. It is known that teachers' capability has a critical influence on students' learning process, like appropriate representations and explanations during the teaching period [13]. There is a powerful need to improve the opportunities to learn (OTL) for teaching training and thus to improve teachers' professional competence [21] [69]. Naturally, full-time teachers have more time to undergo professional training and to transfer the knowledge and skills to their students. With training, the rate of effective teaching can be increased and better skills can be transferred. If the government wishes to increase the number of students choosing to attend vocational schools, increasing the number of full-time teachers is necessary. At the same time, being a part-time teacher in Germany is a good manifestation of social welfare and is also necessary. Based on the analysis, more part-time vocational teachers in schools will reduce the number of new entrants: the government could perhaps set a maximum number of part-time teachers per school and recruit as many full-time teachers as possible.

All kinds of vocational school in Germany undertake vocational education, while different companies require vocational training qualifications. There is a question of whether more

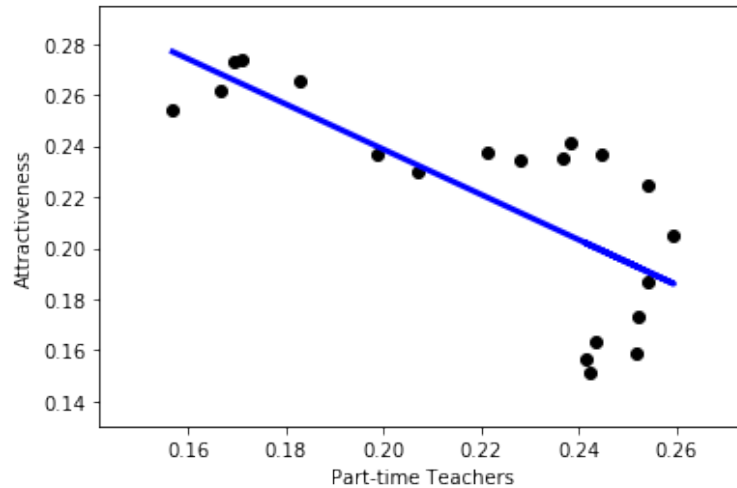


Figure 5.15: Single factor analysis: Part-time teachers in vocational schools in Germany 1997-2017

$$Y = -0.6274 * X + 0.3591, R^2 = 0.55395 \quad (5.13)$$

vocational schools could attract more students. Let's see the fig 5.16 and the equation 5.14, the number of R^2 for part-time teachers equal 0.05814 and the number of the regression coefficient equals 0.0782, it is an extremely weak positive indicator. The number of new entrants does not depend on the number of vocational schools in society; however, it might depend on the demands of the labour market or other factors.

The number of students choosing continuing vocational education and training (CVET) is calculated on the data from the German Statistical Yearbook. From equation 5.15, Y is the rate of participation in CVET, A is the number of students in CVET who comes from the dual system and B is the whole number of CVET students. This indicator aims to test the relationship between the attractiveness and the progression pathway. There are many progression pathways for graduates from the dual system: they might choose to enter the labour market directly, or go on to higher education, or continue to study in higher vocational education. The fig 5.17 and the equation 5.16 displays that the number of R^2 for part-time teachers equals 0.03878 and the number of the regression coefficient equals 0.1348, thus this indicator has an extremely weak positive coefficient influence on the attractiveness. One possible reason why many students hesitate to choose vocational education is that they expect to achieve stride class through education [153]. Whether vocational education could bring it is a considerable question for them. Educational expectations are for students' subsequent development [153] and link to well-being and identify [53]. Here the data are not sufficient to determine that continuing VET has an obvious advantage for students' follow-up studies.

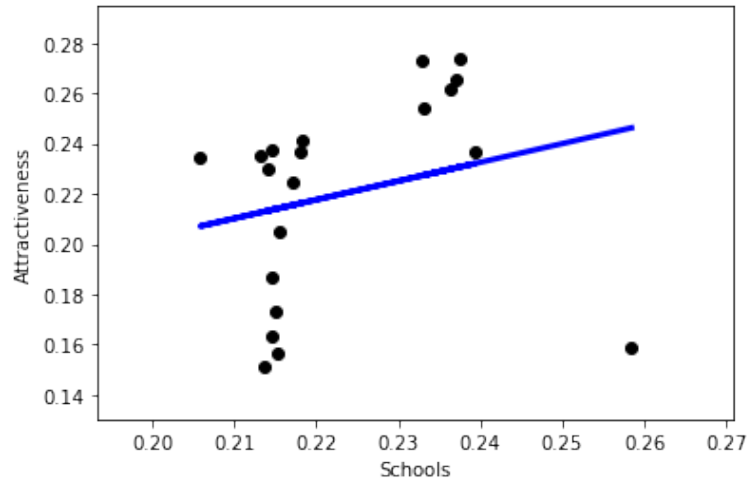


Figure 5.16: Single factor analysis: The number of all kinds of vocational schools in Germany 1997-2017

$$Y = 0.0782 * X + 0.206, R^2 = 0.05814 \quad (5.14)$$

$$Y = A/B \quad (5.15)$$

The most special point in Germany is that the VET system is a dual system comprising the vocational schools and training companies. The dual system is open to everyone who has finished compulsory education, which means there is no entrance requirement for them [96]. Nevertheless, successful completion of vocational education depends on a lot of standards [95], and there are many factors that can influence the result of the completed contract: these include failing the final exam, personal finances and health issues, trainers and college problems, and so on [12]. More completed contracts might represent a lower risk of undertaking vocational training in the dual system, and it could reduce students' insecurity and costs in terms of time, energy and money [95]. According to fig.5.18 and the equation.5.17, the number of R^2 for completed contracts equal 0.8333 and the number of the regression coefficient equals 0.33, it is an extremely strong positive factor. At the same time, completed contracts demonstrate the high cooperation between training companies and the apprentices, because they require both a low contract cancellation rate among companies and a low dropout rate among trainees.

A training allowance is a social welfare grant provided by the Federal Employment Agency (Bundesagentur für Arbeit - BA) for disabled persons in Germany. The fig.5.19 and the equation.5.18 shows the number of R^2 equals to 0.93354 and the number of the regression coefficient equals to -0.7671 and it is an extremely strong negative factor. Like the other two

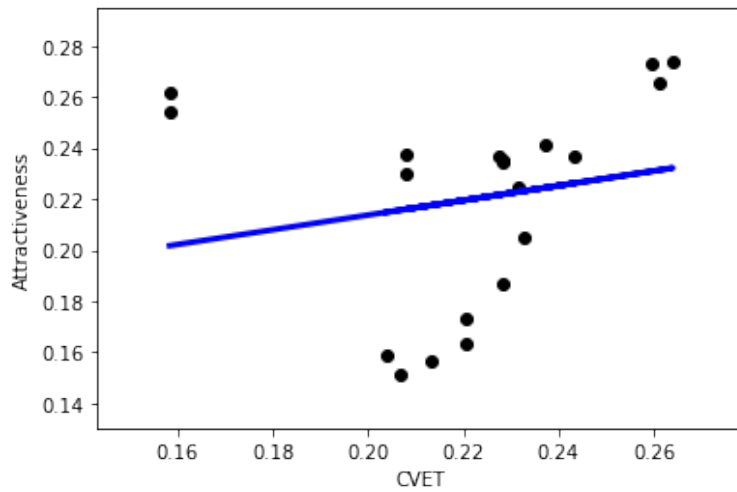


Figure 5.17: Single factor analysis: The number of students in continuing vocational education and training in Germany 1997-2017

$$Y = 0.1348 * X + 0.1923, R^2 = 0.03878 \quad (5.16)$$

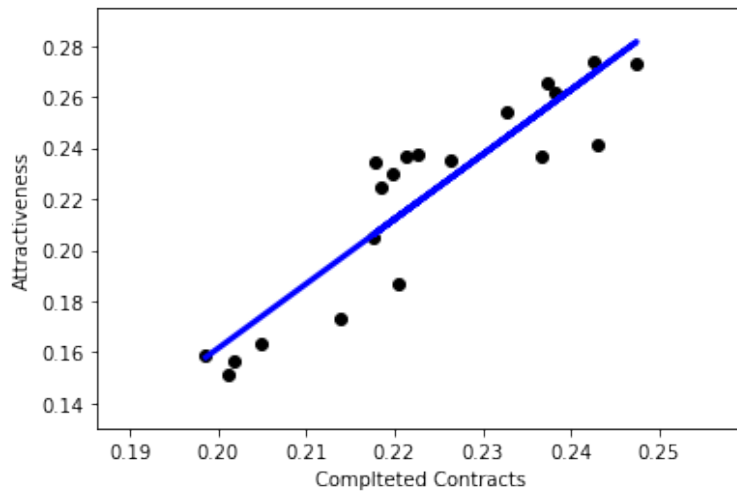


Figure 5.18: Single factor analysis: The number of completed contracts in the dual system in Germany 1997-2017

$$Y = 0.33 * X + 0.1505, R^2 = 0.8333 \quad (5.17)$$

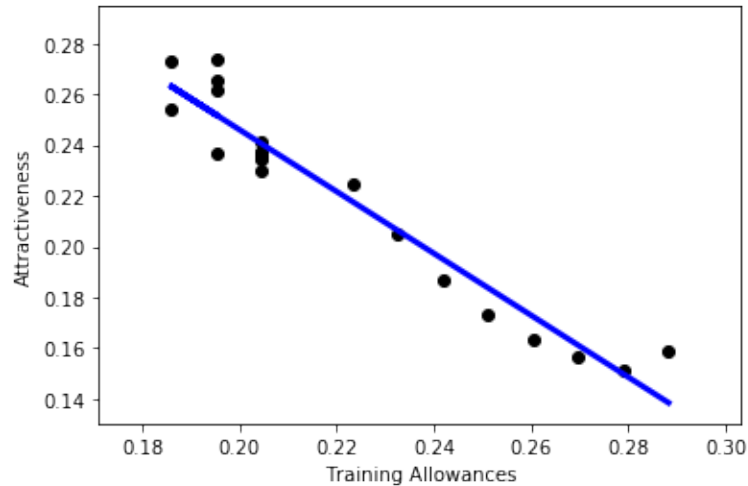


Figure 5.19: Single factor analysis: Training allowances in the dual system in Germany 1997-2017

$$Y = -0.7671 * X + 0.3901, R^2 = 0.93354 \quad (5.18)$$

financial factors explained before, this factor involves the training allowance for every single apprentice. The annual number of applicants in Germany seeking a training position is rising continually [75], and some are reapplications following a previously unsuccessful application [75]. While the government gives financial support, the funding is limited. As more and more disabled youths wish to enter the labour market, individuals could obtain a smaller training allowance; thus increasing financial support for all aspects of vocational education is key to increasing the attractiveness of vocational education.

The assumption of this research is that all factors we find based on the literature review and the research model are related to the dependent variable, the attractiveness of vocational education. The purpose of all single-factor regression analyses is to test whether or not each factor is influential. As a result, those factors are divided into several categories: positive factors, negative factors and unrelated factors. The positive factors are GDP, male employment aged 15–25, the youth unemployment rate, population aged 15–25, full-time teachers and completed contracts. The negative factors are finance per student in vocational schools, finance per student in the dual system, foreign students, part-time teachers and training allowance per person. In this research, of R2 is between 0 and 0.2 for unrelated factors: employed females aged 15–25, graduates, all vocational schools and CVET. The next step is the multiple-factor regression analysis based on all positive and negative factors. The aim is to analyse which indicators have the most influence on the attractiveness of VET in Germany.

5.4.2 MULTIPLY FACTORS ANALYSIS

According to the previous single factor analysis, here will state some relative results.

- Firstly, the economic situation has a positive influence on the attractiveness of VET in Germany. There is no doubt that the development of education is inseparable from economic support. A good economic situation is conducive to the development of the labour market, and it will bring about a good employment situation, which is conducive to social stability. A good employment environment requires a lot of skilled talent, and as the supply side for skilled workers, the attractiveness of vocational education should be increased.
- Secondly, demographic changes, especially the youth population, also have a positive relationship with the attractiveness of VET. The ageing problem in Germany has meant a lack of labourers in the labour market. Every year the number of new entrants is lower than the number of retired workers. At the same time, the low new birth rate is another issue. Increasing the working-age population is necessary, and male employment has higher attractiveness in the labour market. The main reason might be the structure of the employment market: some male-dominated majors like manufacturing, industry and commercial areas are bigger. The youth unemployment rate is another positive factor. A higher youth unemployment rate might represent fewer job positions in the labour market or a mismatch between the skilled workers and the positions. No matter which the situation, individuals should attend more VET to improve or adjust their skills.
- Thirdly, different types of teacher in vocational schools have different influences. The number of full-time teachers has a positive effect, and increasing the number of students in vocational schools needs a guarantee of a sufficient number of full-time teachers. This is one of the basic requirements to keep vocational schools functioning normally. Part-time teachers have the opposite function: more part-time teachers might reduce the number of students in schools. Students need normal study and practice time in vocational schools, and part-time teachers may not offer this. As part-time teachers are a part of German social welfare, their existence is a must. However, the proportions of full-time and part-time teachers in vocational schools should be considered.
- In addition, as was discussed before, the economic situation has been very important to the development of vocational education, including finance for every student in the dual system and in the vocational schools and finance for every disabled person attending VET. Those three factors have a quite similar negative influence on the attractiveness of VET. In combination with the situation that in the past 20 years the financial allocation for vocational education has hardly changed, if individuals obtain more funding it means the number of people choosing vocational education has decreased.

In modern society, developing vocational education is inseparable from economic support. Thus the government should invest more appropriately in VET in the future.

- In order to make up the shortage of skilled talent in the labour market, the German government has policies to allow foreign labourers to come into Germany. Before being employed in Germany, most workers are trained in the dual system. Thus, in recent years, the proportion of foreign workers has increased and migrants have come to Germany. With the number of migrants increasing, the immigrants themselves and second-generation immigrants prefer vocational education because of the language problem or because they are not strong in academic achievement. Against this background, students' self-esteem has reduced, and they might believe VET in Germany has changed to become a form of education for the foreign population. Improving vocational students' self-esteem is urgent, encouraging them to choose VET because of their own interests, not because of the increasing number of foreign students in the system.
- The last single factor is the number of completed contracts in the dual system. This is an extremely positive indicator. It is a special indicator in the German case because it represents the number of graduates in the dual system. As well as the dual system being one of the most special vocational education systems in the world, a high number of completed contracts can attract more students, representing that the dual system is a successful system to improve the attraction to VET. More completed contracts might send a signal that it is not difficult to graduate from the dual system, regardless of the company or the school, which could encourage more individuals to consider VET.

Those previous single-factor analyses are all under the hypothesis that the attractiveness of VET is only influenced by one factor, and the purpose is to pick up the factors which are or are not related. While the dependent variable is influenced by many factors at the same time, the following multiple-factor regression analysis checks which factor has the most influence.

It can be seen from the tab.5.3 and tab.5.4 that 11 factors are analysed in total. Among them, the factor finance per person in the dual system is excluded because it has multicollinearity problems with factor training allowances; therefore ten indicators are regressed in this research model. The result is that five factors correlate with the dependent variable. Among them, there are four positive factors and one negative factor.

The most positive factor is the number of employed male labourers aged 15–25 in the labour market. Limited by the composition of the labour market in Germany, male skilled talents are in higher demand and more males choosing VET could encourage and be a model for the younger generation.

The only negative factor is the number of employed female labourers aged 15–25. The set-

Table 5.3: OLS Regression Results in Germany (Coefficients)

	un-std coef	std err	std coef	t	P> t
Intercept	-0.182	0.255		-0.714	0.493
GDP	-0.069	0.115	-0.084	-0.599	0.564
Employment female 15-25	-1.691	0.729	-0.386	-2.318	0.046
Employment male 15-25	2.170	0.768	0.598	2.826	0.020
Youth unemployment rate	0.247	0.101	0.204	2.443	0.037
Population 15-25	1.224	0.519	0.256	2.356	0.043
Foreign students	0.144	0.097	0.104	1.483	0.172
Full-time teachers	-1.078	0.664	-0.127	-1.624	0.139
Part-time teachers	-0.178	0.257	-0.150	-0.695	0.505
Completed contracts	1.021	0.347	0.369	2.947	0.016
Training allowance	0.013	0.334	0.010	0.039	0.970

Table 5.4: OLS Regression Results in Germany (Excluded Variables)

	std coef	t	P> t	Partial correlation	Collinearity statistics
Finance in dual system					0.000

ting of majors in the dual system does not attract large numbers of female students. With the upgrading of the economy and industry, the potential of the female workforce has gradually been recognized and this situation may change to some extent in the future.

The second positive factor is completed contracts in the dual system. The dual system provides theoretical and practical studies for individuals. Initially, apprentices will sign a contract with a company, and when they pass the final assessment, they finish their training. Thus completed contracts could represent the graduation rate in the dual system: if it is higher, more students will choose VET.

The third positive factor is the population aged 15–25. Demographic changes affect VET in many ways. The problem of the ageing population brings a lack of labourers, and more skilled youths are needed to compensate. An increase in the working age population could benefit from the migrant population: whether this will bring new social problems or not is worth considering in the future.

The fourth positive factor is the youth unemployment rate. Many researchers believe that one factor contributing to a lower youth unemployment rate in Germany is the dual system. It has cultivated a lot of skilled talent that meets the needs of the labour market, and it can be said that vocational education is the real workplace, and vocational education and the youth unemployment rate have a mutually reinforcing relationship.

5.5 CONCLUSION

To sum up, this chapter offers basic information about factors related to the attractiveness of VET in Germany. The theoretical research model is the students' college choice model and related factors picked up from the literature review. The main research method is OLS regression analysis, divided into two steps: single-factor and multiple-factor analysis.

In the German research model, most factors have a positive influence and only one factor has a negative factor. The labour market has the closest connection with vocational education, according to the data analysis. The youth employment or unemployment population functions positively to attract more new entrants to the vocational education system. Many corporations have real cooperation with vocational schools: they educate and train talents together. In this way, the supply and demand sides of skilled talent work together. If the unemployment rate is higher, the vocational education should be developed more, because training under the dual system could help students find a better and more suitable job.

The gender problem is also an interesting result of this analysis. In Germany, the young male labour force is more attracted to VET than is the young female labour force, and one possible explanation is the majors. This is the reverse of the Chinese situation, which will be explored further in the next chapter. In a country with developed manufacturing, the male has more opportunities to study and work in the manufacturing industry, which could attract more males to study and work in the future. With the development of the tertiary industry, more females might wish to study and accept VET.

It is known that German companies have high participation in the dual system, which is treated as a key factor in the success of vocational education. Most apprentices, before they choose VET, consider the cost of the education time and whether it is easy or difficult to obtain the final certification. In the dual system, apprentices have to pass both theoretical and practical assessments. More completed contracts means more apprentices will graduate, thus encouraging more students to study in the vocational education system.

There are also some curious results. There is no obvious relationship between teachers, funding support and the attractiveness of VET in Germany under the multiple-factor regression analysis. Even though they seem to have no correlation, we still cannot ignore their effects. The development of VET cannot happen without the teaching staff, especially the full-time teachers, and financial support.

The analysis yields clear factors influencing the attractiveness of VET in Germany. However, limited by the collected data, it is possible that there are other indicators which are not mentioned in this chapter, such as cultural factors. Furthermore, there may be factors such as the average salary for graduates from the dual system, or problems of self-esteem among vocational school students. An incomplete list of factors is one of the shortcomings of the

thesis. Based on analysis of the previous two chapters, the next looks at the similarities and differences in factors affecting the attractiveness of vocational education in both countries, aiming to compare the countries' strengths and weaknesses.

6 COMPARATIVE ANALYSIS OF THE FACTORS INFLUENCED ON THE ATTRACTIVENESS OF VOCATIONAL EDUCATION AND TRAINING BETWEEN CHINA AND GERMANY

6.1 INTRODUCTION

The previous chapters introduced and analysed the historical development of VET in China and Germany and the factors influencing the attractiveness of initial vocational schools in the two countries. This chapter will collect those previous factors and compare the similarities and differences.

Sino-German relations³⁹ were established in the nineteenth century, and modern diplomatic relations between them have been ongoing since 1972. Germany is China's biggest trading partner and its biggest receiver of technology exports in Europe [76], while China has been Germany's largest trading partner since 2017. The total volume of trade between China and Germany in 2018 was worth 199.3 billion euros. Economic development in China could not progress without a highly educated workforce, while the German dual system is famous around the world and serves as a model for many other countries for skills training [147]. As chapter 2, mentioned, in 1979 the Chinese government implemented its Reform and Opening Up policy and economic development saw a significant shift in status. Subsequently, the German dual system was introduced into China for the first time, and Germany is the only country that cooperates with China in VET at the national level [192]. The methods of cooperation between the two countries include the foundation of Sino-German vocational schools, guidance on VET from Germany, the foundation of VET research institutes in China, and co-operation programmes about training for vocational teachers in China [192].

It is clear that at both the national level and the academic level, China has barely questioned whether the German dual system is suitable for the Chinese environment. The searching keyword 'German Vocational Education and Training' in CNKI⁴⁰ from 2000 to 2020, there are 1043 pieces of paper, and the topics include:

- research on the dual system in Germany;
- research on the enlightenment from German VET;
- research on the policies about the German VET;

³⁹The Sino-German relations is the China–Germany relations which were formally established in 1861 when Prussia and the Qing Empire concluded the first Sino-German treaty during the Eulenburg Expedition. Source: Wikipedia.

⁴⁰CNKI (China National Knowledge Infrastructure) is a key national research and information publishing institution in China. In 1999, CNKI started to develop online databases. Until now, CNKI has built a comprehensive China Integrated Knowledge Resources System, including journals, doctoral dissertations, masters' theses, proceedings, newspapers, yearbooks, statistical yearbooks, ebooks, patents, standards and so on.

- research on the vocational teachers' training in Germany;
- research on teaching methods in German VET system;
- research on school-enterprise cooperation;
- the comparative research between Chinese and German VET system.

There are 93 papers addressing comparative research on VET in the two countries: more than half the papers have discussed how to learn from the German system, and the research method has mostly been the literature review. Most Chinese researchers prefer to use a historical and logical literature review method than empirical and experimental research [84].

In this chapter, the main research aim is to compare the factors influencing the attractiveness of vocational education in the two countries and to check whether those factors are similar or different in the different countries. And the main research method here is the factor analysis method, and it will be divided into several steps:

- the determination of factors' target and scope;
- the obtain of factors;
- the comparative of factors [136].

6.2 LITERATURE REVIEW

The common origin of VET in most European countries, including Germany, was the special social association guild in the twelfth century [202]. Apprenticeship was under the control of guilds, and the economic function in this period was outstanding. It was the special social association guild that decided vocational education's place, content, scale, funding, qualifications, etc [202]. The training of apprentices had to transfer skills while maintaining the labour market in a limited competition environment. In the same period, apprenticeships and guilds were developed in China. Different from Europe, the handicraft industry was not developed into a public industry and was largely controlled by the government [122]. The political function of apprenticeship in ancient China was more important than the economic function, and management of all aspects of the apprenticeship system was in the hands of the government.

With the transfer of the Industrial Revolution from England to continental Europe, the demand for a labour force for industrialization increased [14]. In addition to the economic function, the social function played an important role, and the foundation of vocational schools in the early stages was mainly to maintain the stability of youth at the bottom of society [14]. What the Industrial Revolution brought to European countries was not only the upgrading of skills and factories, but also the expansion of international trade and markets [171]. The main economic structure dominated by agriculture was dismantled with the foundation of new industries and factories and then the promotion of industrial education. Industrial education has been seen as a predecessor of vocational education in China [129], and also since then the whole Chinese education system has been influenced by Western countries. Looking at the history of VET in the two countries, there are only a few papers related to this topic; as a result, it is difficult to conduct a full literature review on the topic.

In terms of the modern VET in the two countries, literature focuses on the training mode in companies, the talent training method, the education system, etc. There is an obvious difference between workplace training in companies in China and in Germany. In Germany, training in the workplace is treated as a normal process of VET [157], while in China all vocational education activities are completed in vocational schools [170]. Funding of VET in China is divided: there is national funding of vocational schools while individual enterprises fund workplace learning [157]. The way in which German companies provide VET is difficult to achieve in China, where there is no basic framework for running the dual system and a lack of the necessary skills for trainers in companies [211].

The dual system VET in Germany has a positive image. Even though in recent years there has been a trend for German education to be academic, the number of students choosing dual system training remains stable [198]. The BIBB has relevant empirical research on the attractiveness of VET in Germany, showing that students believe that the flexible training time, available training courses, effective certificates, professional consultation service, etc are useful for their studies [94]. However, the image of VET in China and in most East Asian

countries has not been of huge significance because vocational education has played a minor role in Confucian thought [164]. In modern China, the priority of education is higher education, not vocational education: regardless of funding or student numbers, higher education is the first choice. Influenced by a demand-driven economic structure, the Chinese government has begun to give more priority to the innovation of vocational education.

- Led by the government, the whole VET system has been rebuilt around cooperation between vocational schools and professional production departments.
- Improving the training quality and setting career standards and an evaluation system have been prioritized: training courses are based on career standards to improve the training relevance.
- Furthermore, most vocational teachers only have academic certificates, and the government are encouraging them to obtain skills qualification certificates themselves. The vocational schools provide after-job training for teachers.
- In addition, the government is actively cooperating with many countries to reform vocational education, at the same time exporting its own experience to other developing countries.

In China, the government has realized the importance and function of vocational education for the training of skills. China and Germany have different policies and methods to attract students to choose VET, as described below.

6.3 METHODOLOGY

Descriptive statistics and comparative factor analysis will be the main statistical tools used in the analysis part. The factors in this chapter have been collected from the previous chapters analysis results including description factors in the historical development of vocational education in two countries and modern relevant factors collected from the linear regression analysis results. The history relevant factors have been divided into 4 aspects of cultural factor, political factor, economical factor and social factor. All the historical related factors are concluded from the development periods about VET in two countries and they are description analysis.

The second method is about comparative similar factors between two countries and those factors are collected from the previous chapters. There are 5 factors will be compared here the youth unemployment rate, the youth population(15-24) rate, full-time and part-time teachers rate, the female and male students rate. All the data are collected from 1997 to 2017 from the official public statistic yearbooks in China and Germany. Under the assumption that all similar in the two countries are irrelevant, the statistical tool is t-test to analyze those data. The T-test is used to determine whether there is a significant difference between the means of two groups as well as it is suitable for small sample group ($n < 30$). And the statistical package for social science (SPSS) is used here.

6.4 ANALYSIS

6.4.1 THE COMPARATIVE ANALYSIS ABOUT HISTORICAL FACTORS BETWEEN CHINA AND GERMANY

Table 6.1 shows the details of four aspects related to the historical development of VET. In terms of culture, Confucianism has had a deep influence on Chinese people's thinking and logic; as a result, it has also influenced the understanding and choice of education [169]. Confucianism has argued and focused more on moral education than on vocational education since the Spring and Autumn period in ancient China. The social classes were divided into four occupations: 'shi (gentry scholars), nong (peasant farmers), gong (artisans and craftsmen), and shang (merchants and traders)'. Academic education among the gentry was ranked in first place: the latter three occupations, related to vocational education, had a lower social status. Though we may emphasize the equality of the education, including the measures of achievement, fairness and opportunity in education [86], prejudice against vocational education still exists and it cannot be eliminated quickly against a background of thousand years of cultural influence. Of course, different countries and religions have different cultural backgrounds. In Germany, there is historically a strong Christian culture: in the sixteenth century, the famous philosopher Martin Luther led the Religious Reformation Movement and he has stated that:

- *'Every occupation has its own honour to God. Ordinary work is a divine vocation or calling. In our daily work no matter how important or mundane we serve God by serving our neighbours and we can participate in God's ongoing providence for the human race.'* [5]

Secondly, later in 17-18th another movement the Enlightenment Movement happened and another German philosopher Kant believed that the vocation was not an external 'calling' from God, but rather an internal striving towards self-fulfilment [130]. It was different from the Chinese-based occupational culture and advocating an equal occupational concept.

Table 6.1: Historical factors influenced on the vocational education and training

Factors	China	Germany
Cultural factor	Confucianism culture	Multiply culture
Economic factor	Small-peasant economy	Mercantilism
Political factor	Unified regime	Federal regime
Social factor	Stability for ruling class	Stability for youth
Individual factor	Pragmatism	Civic education

In ancient China, the foundation of the economy was agriculture, and under the influence of Confucianism, occupations related to vocational education were biased compared with academic education. The imperial government paid attention to the development of agriculture and only promoted agriculture-related technologies under its own control [24]. The Royal Government considered a more stable management environment: rather than eco-

conomic development, it preferred to pursue natural development [164]. In Germany, alongside agriculture, the handicraft and trade industries had been developed since the Middle Ages. The guilds protected the craftsmen's and merchants' interests, and in Europe, where the guilds developed, there was sustained economic growth for the first time [150]. The function of guilds in that time was not only to regulate market competition but also to operate training systems [150] in the form of apprenticeships. Apprenticeships in most European countries were destroyed later because of the Industrial Revolution, except Germany, where they were retained and developed into one training method in the dual system in modern society. During the free trade period, liberalism could not obtain as much as support in other countries, while the German government conserved the models of vocational education [50]. Under the Craft Trade Workers' Protection Act 1897, apprenticeship in the handicraft industry became the normal training method again, and small and medium enterprises (SME) were supported by policies [50]. Similarly, the Chinese market was involved in the global trade market, and the entrance of new industries entrance brought new training methods for suitable skills.

Looking back to Chinese history, in the most periods, it was a united country, so there was a central government to manage all aspects of work for the whole country. Under the feudal government's macro-control, apprenticeships were designed mainly to serve the government [205] and royal interests. The official apprenticeship had strict training in relation to occupations, methods, places and assessment standards, and the government's role was that of decision-maker. Of course, there was private apprenticeship at the same time; compared with official apprenticeships, it was not the main training tool and mainly depended on private teaching. Without official promotion, it was difficult for private apprenticeships to develop prosperously. The German history showed that the unified state was founded on several federal states [41] in 1871. Before, the control of power was held by the guilds and then transferred to the country. Apprenticeships were protected by the government through the promulgation of related handicraft and trade protection acts [50]. Here, the function of government was to protect and promote the development of apprenticeships.

As previous contents mentioned above, apprenticeship in feudal China was divided into the official and the private. The official apprenticeship system built the social division of occupation, and the main social function was to maintain the stability of the whole society under the management of the ruling class. In the twentieth century, the foundation of school-based vocational education heralded changes in the service object of VET. Yanpei Huang stated that vocational education should focus on social production and education could not exist alone without social requirement [87]. In the fourteenth to sixteenth century Europe, the economic structure transformed from agrarianism into mercantilism with the collapse of the estate economy, and farmers moved from rural areas into towns and cities [7]. Apprenticeships provided one path for them to move to new places and obtain new life skills, playing an important role in social mobility at that time. Later, in the nineteenth century, after a unified Germany was established, the vocational schools worked as a tool to help youths integrate into society better and maintain social stability [125].

In a transition period in the nineteenth and twentieth centuries, new industries, new ideas and new education theories were introduced into China from Western countries. The political, economic and social structure changed totally, and new education systems were built. Vocational education was added into the education system for the first time, recognized as a formal education type. Yanpei Huang said that the function of vocational education was to make sure that everyone had his or her own occupation in the society, providing different training for personal development depending on people's characteristics [87]. In Germany, Georg Kerschensteiner sought to promote civic education for individuals through vocational schools. After the twentieth century, both countries recognized that individuals' development was for themselves: of course, one reason was that the Chinese conception of education was influenced by foreign countries.

In sum, the development of vocational education in the two countries from the historical aspect is largely different, and those differences have a profound influence on all aspects of VET in modern society—for example, the attitude towards VET among ordinary people (in China, it is difficult to change people's preference for academic education) or the model of the modern VET system (the dual system in Germany is based on preserving apprenticeships to some extent). However, there are some historical similarities between the two countries: vocational education was in the form of apprenticeships in both countries (in China, this has been eliminated, while in Germany it has been developed into one component of the dual system). Furthermore, in both countries it originated in the handicraft industry, and the focus of the economic structure was different, the function of apprenticeship was also different. Against the background of mercantilism in Germany, the guilds developed prosperity and apprenticeship was promoted; in the Chinese feudal society, apprenticeship was largely controlled by the feudal dynasties, and with the replacement of the last Qing dynasty, apprenticeship was also replaced by modern vocational schools. The last similarity is that both countries focus on the personal development of young individuals themselves, along with the advancement of modern educational concepts and theories.

6.4.2 THE COMPARATIVE ANALYSIS ABOUT MODERN SOCIAL FACTORS BETWEEN CHINA AND GERMANY

Table 6.2 describes the group statistics in relation to similar factors influencing the attractiveness of VET in China and Germany, based on previous chapters' analysis. The most meaningful values are the means, which represent the average of each factor from 1997 to 2017. It is clear that the biggest difference between the two countries is the youth population rate, which shows the proportion of the population aged from 15 to 24. The mean in China is around 16.5% and in Germany is 11.2%, the difference being 5.3%. The young population is potential labour, and a high young population rate is good for the development of the economy while the population structure remains stable [32]. There is a Chinese researcher has predicted before that the demographic dividend has been disappeared in 2013 [31], in the past 20 years the youth population rate in China had a significant decline from 18.8% to 11.5% from fig.6.1. While the changes in Germany looks like in an almost straight line from fig.6.1 and a little bit decline from 11% to 10.2%. A decrease in the youth population rate will result in a direct decrease in the future labour market and will lead to fewer students in all kinds of school. Both China and Germany are trying to use different policies to encourage a larger population. In China, a new two-child policy was promoted in 2015 to solve the ageing problem; according to predictions, after 2030 the labour force will be increased substantially because of this demographic policy [209]. In Germany, meanwhile, migration and refugee policies could be good for solving the ageing problem to some extent [23]. Germany faced demographic changes earlier than China, and the related research into demographic issues also came earlier. As the table 6.2 and figure 6.1 show, the young demographic in China is in a period of significant decline while in Germany it is relatively stable.

Table 6.2: Group Statistics: Similar factors related to the attractiveness of VET in China and Germany 1997-2017

Variable	Country	N	Mean	Std. Deviation	Std. Error Mean
Youth unemployment rate	China	20	0.09184	0.01407	0.00315
	Germany	20	0.09130	0.01396	0.00312
Youth population rate	China	20	0.16544	0.01582	0.00353
	Germany	20	0.11227	0.00352	0.00079
Full-time teachers rate	China	20	0.68478	0.06874	0.01537
	Germany	20	0.71856	0.03578	0.00800
Part-time teachers rate	China	20	0.31522	0.06874	0.01537
	Germany	20	0.28143	0.03578	0.00800
Female students rate	China	20	0.45251	0.03097	0.00692
	Germany	20	0.44876	0.00846	0.00189
Male students rate	China	20	0.54749	0.03097	0.00692
	Germany	20	0.55124	0.00846	0.00189

The second difference between the two countries is the rate of full-time and part-time

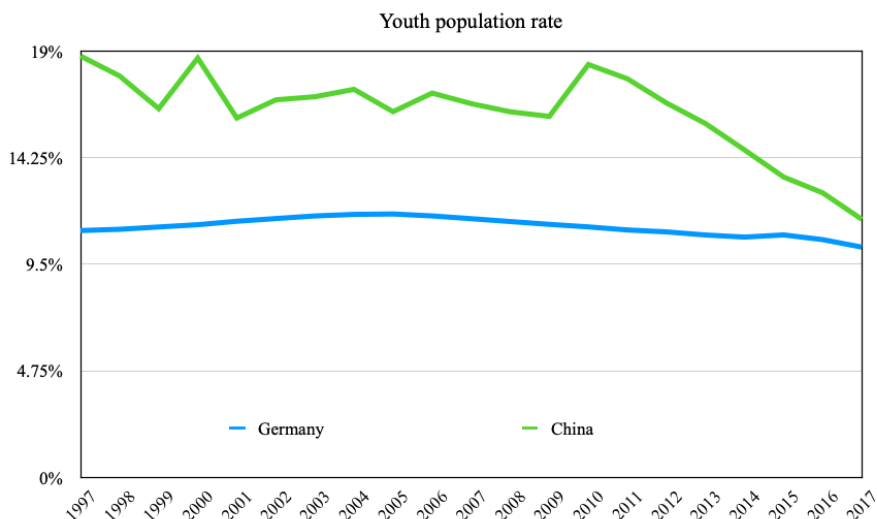


Figure 6.1: The youth population rate between China and Germany 1997-2017

teachers in vocational schools based on table 6.2 and they are an inversely proportional relationship. The mean value of full-time teacher rate in China is 68.5% smaller than 71.9% in Germany, of course, in turn, the number of part-time teachers rate in China is higher than Germany and they are 31.5% and 28.1% respectively from 6.2. Based on the previous analyses in the two countries, more full-time teachers could attract more students to vocational schools. While the average value here shows that the number of full-time teachers in Germany is higher than in China, the trend over the past 20 years says something different. In 1997, the proportion of full-time teachers in German vocational schools was 79.0%, while in China it was 58.6% (20.4% less than Germany). However, in 2017 the situation had been reversed, showing 68.9 per cent in Germany and 78.2% in China. Full-time teachers in vocational schools in Germany should obtain a higher education qualification first, including at least six semesters of Bachelor study and two semesters of study 57. The study courses include professional subject knowledge, teaching methods and practical training in schools 57. Different from the Chinese vocational education model, full-time vocational teachers in Germany are mainly responsible for teaching theoretical knowledge, while practical knowledge is taught by trainers in the training places or companies. Chinese vocational teachers are trained only in theoretical knowledge, without practical experience. With the higher proportion of full-time teachers in China, the missing practical part is now being made up by different methods. Among them, the most common method is brief on-the-job training which mostly uses teachers' free time—for example, in the evening, at the weekend or in the summer/winter holidays. In Germany, the main difference between part-time and full-time teachers is the number of lessons they provide 167. Becoming a part-time teacher will bring less income, fewer entitlements to pension and employee benefits, and fewer promotion chances 167. The number of part-time teachers in Germany in vocational schools has increased over the years, however, while in China, part-time teachers tend to offer more prac-

tical courses, and in 2018, 7.9% of part-time teachers and 3.8% of full-time teachers worked as practical guiding teachers in secondary vocational schools⁴¹. Fewer part-time teachers will lead to fewer practical teachers in vocational schools, which is not good for vocational education in terms of helping students to transition from school to work smoothly.

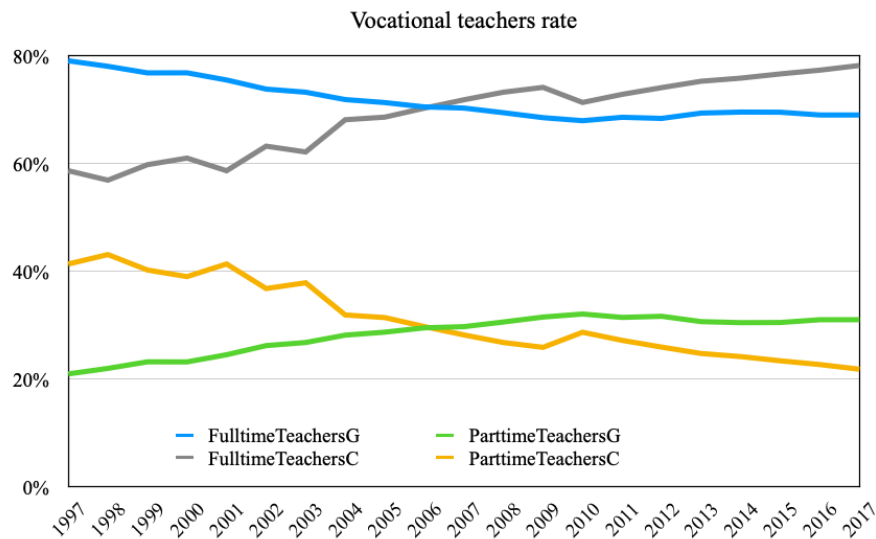


Figure 6.2: The vocational teachers rate between China and Germany 1997-2017

The third difference is the female and male students rate in vocational schools. The mean of female students ratio are 45.3% in China and 44.9% in Germany, and the male percentage is 54.7% and 55.1% based on 6.2. The difference of average is only 0.4%, while the changes in the past 20 years show a big difference trend. In the German case, from fig 6.3 the female and male students percentage displayed a quite stable development from 45.2% to 45.4% for female, and from 54.8% to 54.6% for male. In china part, the number of changes for female students increased from 36.3% to 42.2%, for male students decreased from 63.7% to 57.8%. More young girls in China have obtained more vocational education opportunities in the past years, demonstrating a process of increasing education equality and gender equality. Indeed, the gender gap in vocational schools in China has caught up with the proportion in Germany. Keeping the gender gap stable is a good experience in Germany and it worth China looking at this. Furthermore, in both countries the number of male students in vocational schools is always higher than the number of female students: the difference is that in Germany, this proportion is fairly constant, while in China, changes are obvious. In other words, the proportion of male student in China tended to decline in the past 20 years, and there are three peaks, in 2001, 2003 and 2011, where the number of females has overtaken the number of males. It is worth looking at why the proportion of vocational female students is smaller than the proportion of male students in both Germany and China. There are two possible reasons explaining this phenomenon. Firstly, it is because of the majors preference problem: it

⁴¹Data comes from Ministry of Education, The People's Republic of China

is a worldwide issue that there is a higher proportion of females in majors such as medicine which are mainly provided by higher education. Moreover, vocational education generally provides more engineering majors, which may attract more male students. In China, the current number of female students in universities is around 12.24 million⁴², which is 50.71% of the whole population of students. The second possible reason is the delay of female child-bearing. In modern society, the marriage age and childbearing age for females are later than before, which allows more time for women to be educated.

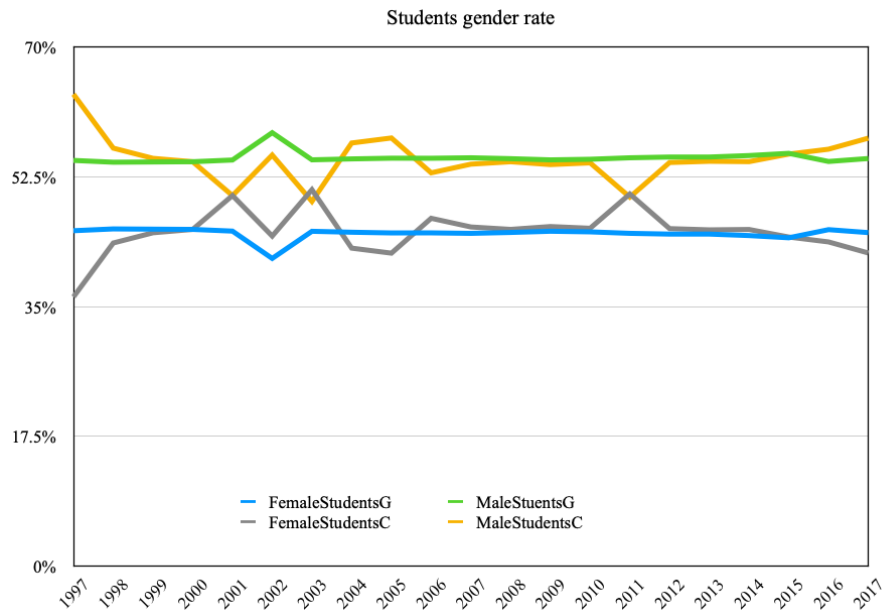


Figure 6.3: The students gender rate between China and Germany 1997-2017

The last is the youth unemployment rate, which has not the significant difference between two countries. The mean in the two countries is both around 9.1%. Some researchers believe that the dual system could help German has a low youth unemployment rate [62], since 1997 it has declined from 10.4% to 6.2% from fig [6.4]. While in China, the youth unemployment rate has an opposite trend in the past 20 years and it has increased from 6.9% to 10.5% from fig [6.4]. There are three points to explain why the dual system in Germany is effective in reducing the youth unemployment rate:

- smooth transition from school to the workplace;
- skilled-based training contents;
- and a well-established VET system [112].

The low youth unemployment rate means more young people are able to find a position in the labour market, which is good not only for social stability but also for economic development.

⁴²Data comes from Ministry of Education of the People's Republic of China (MOE).

In Germany, vocational education was historically used as an effective method to maintain social stability and helped youths better integrate into society. The attention to vocational education has proved an effective way to help youths find a job more smoothly. Even though the mean youth unemployment rate in the two countries is similar, the Chinese government needs to pay attention to making good use of VET in the future.

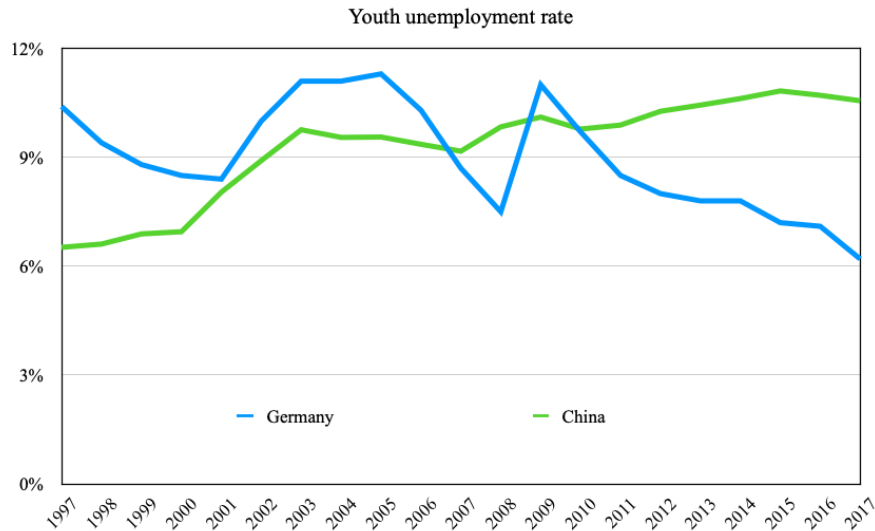


Figure 6.4: Youth unemployment rate between China and Germany 1997-2017

To sum up, from table 6.2, there seems at first to be little difference between China and Germany in terms of influential factors in the past 20 years. When we look into each factor's changes independently from 1997 to 2017, with the exception of the factor youth unemployment rate and vocational teachers, Germany shows a quite stable situation, while in China, every factor shows a change. In China,

- the young population has declined, meaning that the demographic structure in China has been changed and there is no longer a demographic dividend;
- Furthermore, more full-time teachers and fewer part-time teachers in vocational schools, according to the previous analysis, will attract more students source in the future.
- There is also an increasing female student rate in vocational schools, representing more equal educational opportunities for girls in China recently,
- while the youth unemployment rate in China has increased in the past 20 years, and improving the participation rate in vocational schools could help Chinese youths with this problem.

In Germany, youth unemployment is maintaining a declining trend, and most researchers believe this is because of the dual system, which allows a smooth connection between vocational schools and workplaces.

Table 6.3 displays the t-test results for equality of means of those six factors in the two countries to test whether those factors are significantly different in China and Germany. Based on the independent samples t-test results, there is only one factor, youth population rate, showing a significant difference (0.000, $p < 0.05$). This is likely to be due to the different demographic policies in the two countries: in China, the one-child policy had been operating for almost 30 years before 1997 to control the increasing population, and the decline of the demographic dividend led the Chinese government in 2015 to encourage a two-child policy instead. From fig 6.1 the youth population rates in the two countries are getting closer, while Germany maintains a low and stable birth rate and a stable youth population rate.

The factor of full-time or part-time teachers should also be mentioned, as the value of sig.(2-tailed) is 0.059 (quite close to 0.05). The number of vocational teachers in the two countries has moved in opposite directions: in China, the number of full-time teachers has increased while in Germany it has decreased. Considering the Chinese government has always treated the German VET system as a successful model, these changes may be a result of learning from the German experience. Obviously, if one country wants to learn from another country's experience, it should take into account outdated experience, because no matter the educational experience or other social aspects in a country, it never stops upgrading.

The remaining three factors, according to the t-test results, show no significant difference. For the youth unemployment rate, the possible reason may be that in China it has increased by 4.2% while in Germany it has decreased by %. When we calculate the average, the result is a similar number. The sig.(2-tailed) for students' gender in table 6.3 is 0.605 ($p > 0.05$), which means the genders do not differ significantly. Female and male student rates in Germany from 1997 to 2017 show just a slight change: they are generally quite stable and the gender gap remains at around 10%. However, in China, after 20 years' development, the gender gap has narrowed from 28% to 12%, closer to the gap in Germany.

Table 6.3: Independent Samples Test: Levene's Test for Equality of Variances / t-test for Equality of Means

Variable		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Youth unemployment rate	Equal variances assumed	0.164	0.688	0.122	38	0.904	0.001	0.044
	Equal variances not assumed			0.122	37.988	0.904	0.001	0.044
Youth population rate	Equal variances assumed	11.374	0.002	14.667	38	0.000	0.053	0.004
	Equal variances not assumed			14.667	20.884	0.000	0.053	0.004
Full-time teachers rate	Equal variances assumed	12.876	0.001	-1.950	38	0.059	-0.034	0.173
	Equal variances not assumed			-1.950	28.592	0.061	-0.034	0.173
Part-time teachers rate	Equal variances assumed	12.876	0.001	1.950	38	0.059	0.034	0.173
	Equal variances not assumed			1.950	28.592	0.061	0.034	0.173
Female students rate	Equal variances assumed	7.206	0.011	0.522	38	0.605	0.004	0.007
	Equal variances not assumed			0.522	21.821	0.607	0.004	0.007
Male students rate	Equal variances assumed	7.206	0.011	-0.522	38	0.605	-0.004	0.007
	Equal variances not assumed			-0.522	21.821	0.607	-0.004	0.007

6.5 DISCUSSION

This chapter offers a comparative analysis of factors that influence the attractiveness of VET in China and Germany. It is divided into two main parts: a historical comparative analysis and an analysis of the similar factors which could influence the participation rate in vocational schools based on previous linear regression analysis results. From the historical perspective, apprenticeship was treated as the main method of VET in ancient times in both countries. Influenced by its different cultural background, Germany had a more equal environment for the promotion of apprenticeship, while in China academic education was definitely more popular. Encouraged by the handicraft industry in Germany, apprenticeship was developed on a large scale through Europe; in China, it was not widely promoted because the economy was founded on agriculture at that time and there was not a high need for the transition of skills. The German government encouraged the development of apprenticeship to expand its economy and trade, while the Chinese government maintained the main handicrafts and men's skills and, in order to keep the society stable, it encouraged citizens to develop agriculture. Without a supporting social environment, apprenticeship in the two countries developed into two different models at the end of the nineteenth century. After two industrial revolutions, the economic structure around the world changed, and the application of new machines meant that the handicraft industries were gradually replaced by factories. In China, with the fall of the last feudal dynasty, all aspects of society were destroyed, too, including the apprenticeship system. With the foundation of the new education system in China, all education theories and school types were copied from Western countries. During this time, the German government developed modern vocational schools, as well as retaining apprenticeships. Since then, the aim of vocational education has been not only to meet the economic requirement, but also focused on the individual's development.

The second part analysed similar factors in the two countries using t-test data analysis to check whether factors significantly differed. The data suggest that only one factor, the youth population rate, shows a difference between China and Germany. Other factors all show no obvious difference. Among them the proportion of full-time and part-time teachers is quite close to a significant difference: even though the result is the reverse of the hypothesis, details about every factor's changes in the past 20 years could explain this. Most factors in Germany from 1997 to 2017 showed no significant change: compared with the Chinese factor, they tend to hold a more stable position. From a historical perspective, in Germany, the ancient training method of apprenticeship still applies and it has become a German cultural symbol. What's more, the modern dual system in Germany has been designed based on legislation (BBiG), which unites most related social sub-sectors in the VET system as a whole. However, in China, the increasing proportion of full-time teachers and of female students is developing towards the German proportions. When the means of those factors are checked, most show no difference, but this does not mean there really is no difference. Different from the German case, the traditional education system was totally replaced in China at the beginning of the twentieth century, the new education model being based on Western countries' experience. The modern VET school-based system has not explored for a long time, and

the government is still discovering a suitable method to combine theoretical education and practical teaching. This could be an important reason why the German system has developed steadily while the Chinese system is full of changes.

In sum, there is a lot of difference in VET in China and Germany. The VETs have different origins and have followed different paths. With globalization, economic and trade interaction has made more connections among different countries. The basic structure of the Chinese modern education system was based on Western education theories, while Germany developed the modern education model as well as saving the traditional apprenticeship. It has been proved that the dual system is a successful education model for VET, and a lot of other countries in addition to China have tried to research or copy the system. When this model is applied in their own countries, most research has focused on a superficial comparison to discuss whether or not the dual system is suitable, whereas this chapter compares specific factors in two countries. It still needs to be mentioned, however, that as China has developed towards the German condition, the dual system has changed, too. It is not an immutable system. For example, when China has begun to add more full-time teachers in vocational schools, Germany, at the same time, began to reduce and adjust the number to meet the requirement of new conditions.

7 DISCUSSION AND CONCLUSION

7.1 KEY FINDINGS

7.1.1 HOW THE HISTORICAL FACTORS INFLUENCED THE CHANGES OF VET SYSTEM IN ANCIENT TIME?

The modern VET systems in China and Germany are different, and one deep influence comes from historical factors [49] [64]. In ancient times—around the tenth and eleventh centuries—the origin of the model of vocational education in ancient China and Germany was the same: apprenticeship. It was a system to train workers and transfer skills, mainly in the handicraft industry, which was based on a master-apprentice model.

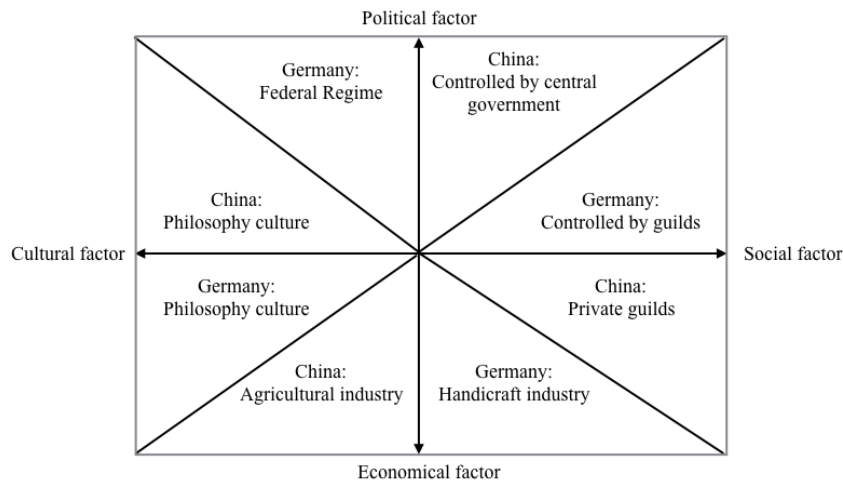


Figure 7.1: How the historical factors influenced the development of apprenticeship in ancient time between China and Germany

The fig [7.1] shows four main factors which influenced the development of apprenticeship in ancient China and Germany. Firstly, there is the political foundation, China has thousands of years of history as a unified country, and during most of the feudal period, China was under the dominance of the royal house [101]. The ruling strategy in ancient China was seen as a self-strengthening one, while in European countries it was a self-weakening strategy [101]. In this period, the traditional ruling by the aristocracy was gradually replaced by a meritocracy through the ancient civil service exam [127]. As a result, the first difference between ancient China and Germany is the centralization and decentralization of the ruling power.

All aspects of the apprenticeship system were decided by the ancient Chinese central gov-

ernment—for example, the period of study, the assessment of the final test, etc. As those aspects were managed by guilds in most European areas, apprenticeship in Europe was a kind of training system, and masters and apprentices in that system learned handicraft and trade skills together [189]. Of course, the training of a new workforce in their own industry was only one function of the guilds: there were also other activities, such as the limitation of entrants, the maintenance of production quality, etc [149]. There is no doubt that in the pre-industrial period, the guilds created social capital and they fostered shared norms in Europe [149]. The guilds in feudal China were not quite as positive: most handicraft workshops were owned by the government, and even private guilds should serve the government [127].

The demographic growth and the process of urbanization in ancient China after the Song dynasty is obvious [127], and income in the form of taxes in China mainly came from the agricultural industry [101]. Against this background, even though the handicraft and trade industry developed at the end of the feudal dynasty in China, the government still persevered in promoting the development of agriculture. During the Middle Ages, members of guilds took part in government activities positively [127], and because of the Age of Discovery, the trade industry, especially in Europe, developed quite well. At the end of the medieval period in European countries, because of protectionism [127], the influence of the guilds declined gradually.

At the end of this period, Europe entered the Age of Enlightenment. The establishment of human rights was advocated based on the concept of equality and freedom of speech [106]. The cultural and philosophical background in Europe emphasized the meaning of equality: regardless of people's differences or occupations, they were fundamentally the same. As Kant said, occupation was just an internal striving towards self-fulfilment [130]. The dominant philosophy in ancient China was Confucianism, which stressed the concept of prioritization of rights. The classification of occupations in ancient China proved this point, with the hierarchy of gentry, scholars, peasants, craftsmen and merchants. The aristocracy in China was gradually replaced by a meritocracy with the development of the feudal society [101], while the main pathway for the ruling class's new meritocracy was through higher education or academic education. Vocational education to train craftsmen and merchants was not prioritized, and thousands of years of philosophy had a deep influence on Chinese people's thinking. Even in modern society, the requirement for the civil service exam in most positions is higher education rather than vocational education.

During this period, the traditional VET models in the two countries were similar to one apprenticeship in two countries. Training mainly happened in the handicraft workshops, while the difference was mainly reflected in the management and promotion of it. Management in China was by the feudal ruling class, who mainly relied on the development of agriculture rather than the handicraft industry. In Germany, meanwhile, the guilds were responsible for the promotion of the handicraft and trade industry because they would bring interest. Different promotions and motivations meant that in Germany the attractiveness of apprenticeship was higher than in China.

7.1.2 HOW THE HISTORICAL FACTORS INFLUENCED THE CHANGES OF VET SYSTEM IN PRE-MODERN TIME?

During the pre-modern period, the world saw significant changes in almost every aspect of society. Firstly, there was the political factor, as shown in fig.7.2. Germany became a unified country in 1871 and it was able to perform its government function more effectively, such as recycling the right on education management and expanding the effective scope of the laws. During this period, the last feudal Qing dynasty in China was replaced by a new capitalist regime, the Republic of China. This new regime was based on Western countries' experience and promoted new thinking and culture, including democracy and science.

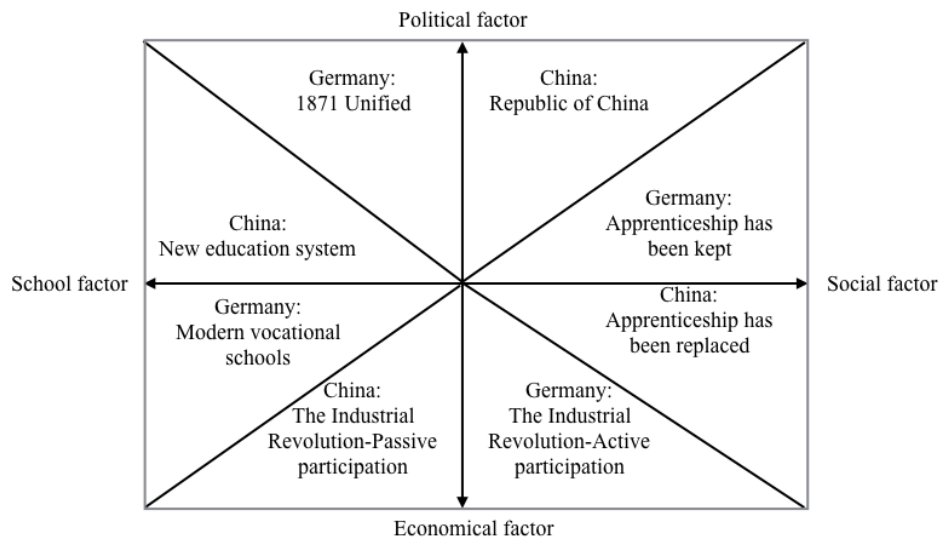


Figure 7.2: How the factors influenced the changes of vocational education and training in pre-modern period between China and Germany

The traditional apprenticeship in those two countries developed into two directions: in Germany, it was retained, while in China it was replaced by the new vocational schools. A possible reason for the German position could be the change in guilds' function as they transitioned from managers into supervisors. In the late medieval period in many European countries, many members of guilds took part positively in government activities [101]. When some of those masters became the owners of new factories, they applied the original training method to new positions while the government enacted laws to protect their interests. For example, the law on the Freedom of Industrial Activities in 1869 [137] created rules about trade freedom in Germany as well as retaining apprenticeships. The situation in China was totally different: the apprenticeship service of the ruling class was subverted, and as a result, the traditional training method in the handicraft industry transitioned into a private or personal activity.

The Industrial Revolution had a direct influence on the changes to apprenticeship in Germany, as the apprenticeship training methods were applied in the new factories. Even though the function of guilds changed, some members of the guilds who were masters became the owners of new factories. Liberalism could not be supported or recognized in Germany, while conservative legitimization models of vocational education were retained during this time [50]. However, when the Industrial Revolution came to the Chinese market, new industries and new positions increased the requirement gap for new skills talents in the labour market. The government encouraged new education models: considering the market demand as well as Western countries' experience, they built new vocational schools and invited foreign teachers to train new talents. Apprenticeship in China gradually disappeared because the whole market was gradually destroyed.

The vocational schools (Befuschule) in nineteenth century Germany were seen as a public vocational training method, and the handicraft industry believed that training in the workplace was the right thing to do [50]. According to Deissinger, the foundation of the dual system was not an educational construct, and vocational schools were a kind of supplement for training in workshops [50]. With the foundation of vocational schools at the end of the nineteenth century, fewer companies were able to participate in decisions and most policies were developed by educators who worked for the government.

New industries and new positions which reduced the requirement for new training methods for workers increased, and since then the traditional apprenticeship in the two countries has developed very differently. Modern vocational schools' foundation also had a different function in the two countries, which reduced the different origins of modern VET. In other words, the new industries originated from Western countries and the training methods for workers in those new occupations also developed from Western countries. When the changes came to China, there was a period for them to conflict and then merge with Chinese culture. Vocational education was still not a priority choice for most students, but it has evolved in the formal education system since that time.

7.1.3 HOW THE MODERN SOCIAL FACTORS INFLUENCED THE ATTRACTIVENESS OF VET?

This part mainly presents the findings about the positive and negative factors influencing the participation rate in initial vocational schools in China and Germany and states the similarities and differences between them. Firstly, in China, the influential factors after linear regression analysis are three related factors: teacher distribution, youth population proportion and the youth unemployment rate in the labour market. In China, based on analysis of data from the past 20 years, female teachers may make initial vocational schools more attractive than male teachers. One possible reason is that at the higher education level, education majors normally have more female students. Working in schools may offer women a more stable work environment, and it could help them to take care of their family more. Furthermore, full-time vocational teachers may be more attractive than part-time teachers in vocational schools. In 1997, the ratio of full-time to part-time teachers was around 60%: 40%, and recently it has been about 80%: 20%. This change represents the development of gender equality in China, especially in schools, as females have more work opportunities than before; on the other hand, the scale of teacher-training education has increased and so there are more full-time teachers to work in vocational schools. Demographic changes, especially the young population, also have an influence on the enrolment rate in Chinese vocational schools. The young female population is more attracted to vocational education than the young male population. In the past 20 years, the youth gender demographic proportion has developed even though the total change of the youth population has decreased. Replacing the one-child policy, the new two-child policy has been used to encourage an increased population and the dividend which the one-child policy brought is fading. The education rights of the young female population have also increased, and VET is seen as a good way for young girls to obtain skills training, especially in poor areas. Finally, the youth unemployment rate in the labour market has a positive correlation with the number of entrants in vocational schools, because vocational education will provide direct skills training which links to jobs.

Similar to the Chinese results, in Germany, the attractiveness of VET is also related to demographic changes and the youth unemployment rate. The extra different factor is the number of completed contracts. The first difference is that in Germany the employed male population may have more attractiveness than the female population; in the past 20 years, the gap between males and females has always been around 10 per cent. In both Germany and China, the number of young males in VET is higher than the number of young females. As mentioned above, this may be because of the distribution of majors and the delay of female childbearing. In both China and Germany, more females are going to university. The youth unemployment rate in Germany also has a positive influence on the enrolment rate in initial vocational schools. Many researchers contend that the dual system in Germany lowers the youth unemployment rate because more of the young population attend dual system training [58]. This is also a reason why many other countries prefer to learn from the dual system to solve the youth unemployment problem in their own country. The most obvious difference between Germany and other countries is the dual system, the combined school-based and workplace-based model. The data also show that more completed contracts from

the dual system will attract more students to choose VET. The foundation of the special modern dual system was influenced by many historical factors. It is not easy for other countries to copy, and even when though borrowing the VET experience, there are some adaptation problems.

Chapter 6 gives an example of why it is difficult for one country to copy another country's experience. The similar factors in China and Germany include the related population, unemployment and teacher problems. The t-test method is used here to prove whether those factors in the two countries are significantly different. Some factors seem to have no difference—for example, the youth unemployment rate—while the development trends of this factor are totally different. Only the young population rate shows a significant difference, while Germany has maintained quite a stable level in the past 20 years. The remaining factors, especially the proportion of full-time and part-time teachers in the two countries, show opposite trends, in that the rate of full-time teachers in Germany has decreased while it has increased in China. The OLS result shows that more full-time vocational teachers in China could attract more new entrants in vocational schools while this is not appropriate for Germany; meanwhile, the policies on vocational education, even though in one country they were not fixed and they kept changing.

7.2 IMPLICATIONS

7.2.1 IT IS NOT TO PROMOTE COPYING WHOLE EDUCATION MODEL FROM OTHER COUNTRY

One of the research questions addresses whether it is suitable for China to learn from the German dual system experience, and one of the research aims was to ascertain whether it is necessary to apply experience from the German dual system in the Chinese VET system to improve the participation rate in initial vocational schools. The result shows that copying an education experience is not easy, for two main reasons. Firstly, every education system has its own development history and it has been influenced by different factors. Traditional German apprenticeship has a history of combining vocational education and training companies, having happened in the real workplace originally; later, when the vocational schools in Germany were built, it developed step by step through cooperation with training companies. The Chinese situation, meanwhile, saw the demise of the traditional official apprenticeship system with the disappearance of the feudal dynasty. Later, when the new education system was built, vocational schools were added into the general education system. There was no chance to cooperate with companies, and the development of Chinese industry was not promoted for a long time. The German modern dual system is not only a VET system but is supported by many other social subsystems:

- It is supporting by the law through the Vocational Education and Training Act (Berufsbildungsgesetz (BBiG)) which regulates the responsibilities and rights of training companies and apprentices. The function of the Act in vocational education has developed since the end of the nineteenth century: after many reformations it adopted its modern style.
- Furthermore, every industry association plays an important role in supervision and guidance, just as the guilds in the different industries were the original developers of apprenticeship.
- In addition, the political structure in Germany has reduced the dual system's flexibility, and in every state the government has higher management rights over education than previously.
- The economic environment has also contributed to high demand for skilled talents in the labour market, the manufacturing industry in Germany having the highest proportion.
- The foundation of modern vocational schools in Germany began to focus on students' personal development, and in modern society, the VET system includes not only the dual system but also all kinds of full-time schools to meet different students' requirements.
- Moreover, the training methods for vocational teachers are quite strict and are different from that for teachers in normal education systems. They should obtain related diplomas and take part in practical training. Some professional workers in training companies also work as part-time teachers to improve vocational students' practical skills.
- The relationship between the youth unemployment rate and the dual system is mutu-

ally beneficial, in that a higher youth unemployment rate will prompt more students to choose vocational education, and because of the dual system, German has a strong reputation for low youth unemployment.

All social factors positively affect the VET system, while in China, the dominant part of vocational education is the vocational school, which has its own characteristics.

- The government, especially the central government, plays an important role in promoting the development of VET in China. In 2019/2020, policies for promoting VET in China were related to improving the enrolment numbers in higher education vocational colleges: the number is currently about 1 million students, with all colleges picking up increasing numbers of students. With a united government it is normally easier to carry out policies immediately.
- The economic structure in China has changed significantly in the past years, developing from an agricultural country into a manufacturing country. Demand for a related skilled workforce has increased; thus it is urgent for China to develop vocational education.
- Because of the traditional culture and education model, however, it is not easy for a Chinese citizen to change their thinking on education. A lot of potential students and their parents discriminate against vocational education to some extent. In general, vocational schools will not be their first choice.
- Most different levels of vocational school in China have taken on responsibility for skills training, as companies are unwilling to take part. The traditional skills training system in the handicraft industry was replaced by the modern education system at the beginning of the twentieth century. Furthermore, there is now a related law to promote cooperation between training companies and vocational schools.
- Both practice and training courses normally happen in vocational schools in on-campus training centres, and the related vocational teachers have also been trained and educated on the campus. One main problem for both vocational students and vocational teachers is that they have few opportunities to keep up their practical training. This is something to learn from the dual system.
- It has been proved in this research that the number of full-time and female vocational teachers in China affects vocational education's attractiveness for new students. Over several decades, the quantity of teachers has improved, and now is the time to improve the training quality.

The German dual system is a stable VET model, and it has deep cooperation with other social systems in Germany. Why other countries have often failed to replicate the experience is quite a complicated matter. China has its own vocational education system and it is possible to cooperate with some German companies to promote apprenticeships as a pilot project. However, the whole dual system may not be suitable for the Chinese education system. Whether historical factors or modern factors, the attractiveness of VET is influenced by

different things in different countries. Simply learning from another country's experience is not enough, and analysis of the attractive factors and how to use those factors to improve the participation rate in vocational schools may be necessary.

7.2.2 HOW TO IMPROVE THE ATTRACTIVENESS OF VET IN CHINA

As highlighted in previous chapters, there are several factors that influence the participation rate in initial vocational schools. Knowing how to make use of those factors to attract more entrants is essential. Firstly, the training method for vocational teachers should be reviewed to include normal education in universities for vocational teachers and on-the-job training in schools.

1. There are two main educational systems to cultivate teachers in China: the normal university system and the education college system subordinated to a university [108]. Regardless of the system, obtaining a Bachelor's degree in education science is a necessary prerequisite to becoming a teacher. However, there is no VET major in the Bachelor's degree, and with a higher demand for vocational teachers in modern society, it is feasible to add related majors to the normal Chinese education system.
2. On-the-job training methods for training vocational teachers involve summer holiday and weekend training. Those training activities are normally held in universities, and the training content is divided into courses and on-site studies in some vocational colleges. One problem is that during the summer holiday period, teaching activities are generally on hold: as a result, not all of the equipment may be available to use. Most vocational teachers will not go back to universities to be educated again, and practical training for teachers is important to help them to improve their teaching skills and knowledge.
3. Because of ongoing changes in the labour market, the requirement for lifelong learning and training for vocational teachers has become more and more important. As vocational teachers, they should have a good connection with both theoretical knowledge and practical training. Every technological revolution brings changes, and it is teachers' responsibility to keep ahead of those changes.

Gender equality in China has advanced well recently, and the gap between female and male students in vocational schools has narrowed.

1. The analysis above states that because of the one-child policy, more young females have the opportunity to enter schools than before. In some urban areas, this policy has been promoted well; however, in some rural areas, the situation is different. Normally, compared with city girls, country girls need more education opportunities. They have less chance to go to school perhaps because of economic reasons, or their parents believe girls should work and earn money earlier to reduce stress on the whole family. One advantage of initial vocational schools in China is that tuition has been free for every student since 2009. At the beginning of this education system, welfare was promoted in rural areas to attract more students to vocational education.
2. A further suggestion to attract new entrants to vocational schools is increasing the financial subsidy for every vocational student. With a basic salary, female and male students alike can achieve basic living security as well as receiving training and education in life skills. In Germany, there is a mature dual system to guarantee every apprentice's

training allowance, and this is a good method to consider. If there is no training company to supply financial support in China, then the government and vocational schools should take on the responsibility to improve the higher education subsidy.

There are several suggestions here to re-regulate the employment standard in the labour market.

1. One recruitment requirement is the level of degree. The level required for vocational education is generally lower than for higher education, which puts graduates from vocational schools in quite a passive situation. The job positions in the labour market available to them are fewer those available to graduates from higher education. There is a suggestion here to replace degree standard with ability standard, because compared with the degree, ability is more appropriate for the job position. Of course, the degree is an important assessment standard, but it should not be treated as the first or only standard.
2. Secondly, in the labour market in China there are quite a lot of occupations for which there is no requirement to undertake any formal education or training: for example, baker and barber are quite common jobs which in Germany require VET. Those kinds of job in China are normally trained in the traditional way, through a real apprenticeship. As an apprentice, the worker is trained in the real workplace and evaluated by their master. The suggestion is that more occupations could be incorporated into the VET system in the future to make the training more professional, scientific and standardized.
3. Thirdly, the gap level in different education systems in China cannot be narrowed quickly, and adding a connection between vocational education and normal education is possible. In Germany, the VET system includes not only the dual system but also some kinds of full-time vocational school. Those vocational schools normally provide students with more opportunities to pursue higher education rather than prepare for a future job. Education in vocational schools in China is currently one-sided, focusing on skills training. Thus, more different types of vocational school could be set up to meet different students' requirements in the future. Furthermore, credit transfer could be considered between vocational education and higher education in China: firstly, across the world, credit transfer in higher education among different countries is possible and flows well for students who prefer to pursue higher education in different countries; secondly, the theoretical teaching in Chinese vocational schools is similar to higher education, especially for the same major.

The low birth rate has become more and more serious in most countries, though not in Africa. Improving the youth demographic in the labour market could attract more new entrants in China and Germany. In Germany, in the past years, the immigrant population has solved this problem to some extent. In China, however, there is quite a strict immigration policy; thus it is impossible to learn from Germany here. To encourage population growth, the two-child policy replaced the one-child policy in China in 2015. What result this will bring

will be seen in the future.

The factors related to the attractiveness of VET are diverse and mutually influential. From the above suggestions for China, it can be concluded that what one country can learn from the educational experience in another country depends on the specific problems to be addressed. Firstly, the attractiveness factors for VET should be clear in China; then, when analysing how to make use of those factors, policies could be borrowed from other countries.

7.2.3 HOW TO IMPROVE THE ATTRACTIVENESS OF VET IN GERMANY

Germany has a successful VET system and the dual system is well-known around the world. The most relevant factors in the German case to attract more students to vocational schools mainly include demographics.

1. Firstly, there is the youth population. A lower birth rate means a smaller proportion of young people, and how to promote population growth is a critical problem. Unlike in China, there is no population growth policy in Germany: the government is simply trying to encourage national citizens to reproduce. On the other hand, the German government has recently received many immigrants and refugees to compensate for the shortage of labourers. In addition, international cooperation on vocational education is possible, recruiting new workers from other countries and doing training work in Germany to meet the requirements and standards in the local labour market, while applying the dual system in international German companies in other countries as a pilot project. This may also attract local workers to go to Germany to be trained in the dual system. The international reputation of the German VET system is good. The purpose of the above suggestions is to attract foreigners to Germany to work.
2. Secondly, the demographic problem includes not only the younger generation but also the ageing problem. Because the research object is more related to the younger population, data on the elderly was not collected in the research model. However, it still needs to be mentioned here. In some Asian countries, such as South Korea, because of the ageing problem, the government encourages the retired workforce to retrain by vocational education and continue to work.

The number of completed training contacts is another positive factor which could improve the attractiveness of VET in Germany. More completed contracts give a signal that there is a higher graduation rate in the dual system. Some students who choose vocational education may do so because they are not good at academic study, and the higher graduate rate may indicate that the assessment standard in the dual system is not, or is not only, related to academic scores. In looking at how to maintain a high and stable participation rate in vocational schools in Germany, perhaps the opposite should be addressed, ascertaining the reasons that students drop out of vocational schools. The system and model of VET in Germany has developed over a long time and it has a higher social reputation compared with most countries. Against this background, factors that have reduced the number of students dropping out of schools could be researched further in the future and the related methods adopted to solve the problem.

Compared with the Chinese VET system, the German system is a mature system that acts as a model of how to build a VET system. Not only in Germany but also among some international organizations, it is believed that the dual system is good for the development of the economy and training of domestic skilled talents. To retain and improve the attractiveness of VET in Germany, suggestions include solving the problem of the shortage of labourers in the

market and paying more attention to why students drop out of vocational schools. All related social subsystems cooperate to support the smooth running of the VET system in Germany, while this is an urgent problem that needs to be solved in China. There should be a specific and independent system in China. In Germany, the VET system has been around for quite a long time; now China is in the discovering process, too, and, without doubt, the successful experience of other countries will be the first point to consider. The research makes the point that the whole foundation and structure of the dual system cannot be borrowed, though some specific points may be considered: it depends on specific issues, and the social environment should also be considered.

7.3 LIMITATIONS OF THE PRESENT RESEARCH

Some potential limitations in this research should be noted here.

1. Firstly, there are not enough related topics and theories to support this research. A lot of the literature discusses VET, but there is little focusing on its attractiveness and there is a lack of literature specifically comparing the attractiveness of VET in two countries. This may be because the attractiveness of VET is not a short-term problem but will take a long time to resolve. The main theoretical model applied in this research is Chapman's model of students' college choice [37], which contends that there are three main factors that influence students' choice of college: social factors, economic factors and a combination of the two. This model has been applied to vocational schools in two countries and combined with the collected data. The theoretical model has been borrowed from normal colleges in the United States, and the previous chapters have explained the applicability of various factors to VET in China and Germany. One of the research targets was to supplement this topic.
2. Secondly, there is a lack of theory on the attractiveness of VET. The attractiveness of VET in this thesis is defined as the rate of the new entrants into initial vocational schools in the two countries. The thesis contends that it is important to improve the attractiveness of VET and explores how to improve it. There are not many studies on this topic. One method that may improve it to some extent is the skills competitions. [36].
3. Thirdly, a limitation of this study is that the incomplete data. All data are collected from official published reports and some data could not be found in those reports—for example, the tracking of graduates from vocational schools, which could be represented by values or numbers, such as the level of salary for graduates; this could be considered as a related factor. Furthermore, detailed explanations of some related factors are not sufficiently clear or deep, such as the training methods for vocational teachers in both Germany and China. Nevertheless, this is a quite relevant factor only in the attractiveness but also the quality of VET. In different countries, the proportions of different types of vocational teacher are also different, and how the rate of vocational teachers is established is not quite clear.
4. Fourthly, the list of factors is incomplete, and it is impossible to complete. The main analysis method is linear regression analysis, during which the selection of factors is restricted. The factors selected could be a form of prediction and are uncertain. In this research model, the attractiveness of VET is influenced by one factor or many factors: as a result, single-factor linear regression analysis and multiple-factor analysis have been applied at the same time.
5. Fifthly, this research is mainly supported by the CSC(China Scholarship Council), which is a non-profit organization of the Chinese Ministry of Education supporting interna-

tional academic activities. The personal prejudice in this research is trying to learn from the advanced experience of the German dual system, and one research target is to ascertain whether it is viable for one country to learn from another country's experience. Through a comparative study, the assumption has been repudiated. The education system and model in every country has been influenced by different factors and so it is not possible to copy the German experience directly into the Chinese VET model.

6. Finally, the data analysis results display some parallel situations rather than logical causal relationships, which means those results may have happened by chance in the past 20 years. For example, in respect of female teachers' influence on the attractiveness of VET in China, it cannot be said that more students choose vocational education because of there being more female teachers. There are other possible factors that could or contribute to the phenomenon. It can also not be stated that male students are more likely to choose vocational schools and see them as more attractive: this is merely a data result, and maybe in modern society more female students choose to go to university because of their preferred professional choices.

7.4 FURTHER RESEARCH SUGGESTIONS

In the end, there are several further research suggestions will be displayed as follows:

1. Based on the research results, the relationship between the attractiveness of VET and the factors affecting it should be further and more deeply examined in future research. For example, vocational teachers play an important role in the whole VET system, and how to train vocational teachers is an urgent problem in China. Different from the German dual system, vocational teachers' path in China is school to school, meaning that after they graduate from universities they go directly to the workplace without skills training. This lack of practical progress is a problem in the whole Chinese VET system. One good aspect is that there have been many attempts in different areas to establish cooperation between vocational schools and training companies, where training is provided not only for vocational students but also for vocational teachers. The issue is how to apply the pilot project to the whole VET system in the future, and which model is most suitable for the development of Chinese VET. It is important to explore how to make use of the various social systems in cooperation with the development of VET in China.
2. One limitation in this research is that all collected data are objective social-related values, and students' subjective motivation to choose VET is not mentioned. The subjective reasons that students choose vocational schools need to be explored, along with what knowledge and skills they want to learn or what resources they want to gain or develop from the VET. It is also necessary to address whether they wish to go to work directly or pursue higher education after they finish their study in vocational schools, and whether the transition from school to workplace or university is smooth. The problems in modern VET perceived by student should be examined. Furthermore, research on reasons for students dropping out of vocational schools are important. These questions are related to students' choice of vocational schools in the future.
3. More data could be provided in the future on whether the factors presented here influence students' choice of vocational school. The average salary for graduates from vocational schools has not been collected in this thesis, and this could form part of a new study in the future. There is some literature addressing salary as a factor which could influence students' choice, and whether it is relevant in the Chinese case could be explored.
4. If the average salary for graduates from vocational schools is difficult to collect, then future research could discover some new research methods—for example, interviews with vocational students and vocational schools' graduates. The experience of the students' choice and whether they achieve their goals after graduation could then be tested.

5. The gender problem in vocational schools also warrants further research. Nowadays, in most vocational schools, the proportion of male students is higher than that of female students. Research could explore whether it is necessary to improve the female student rate in the future and, if it is necessary, how to attract more female students to choose vocational education. The gender problem is not merely a school problem but a social problem; it is not only an issue in vocational schools but in universities. How to address the gender equity issue in vocational schools is an urgent problem which needs to be solved.

6. The influence of technological development and social revolution on vocational education in the future is another area for exploration. This thesis indicates that with every social development in both Germany and China, the education model has also developed. Now, in 2020, COVID-19 has spread around the world: we have yet to see the lasting influence it will have on VET, and whether the VET system and vocational schools need to improve their ability to deliver online courses.

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