## Sustainable Cooperation between Schools, Enterprises, and Government

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Promoting close and sustainable cooperation between schools, enterprises, and government has become an important concern in many countries. However, the reality is that the cooperation between schools, enterprises, and government has not been very effective.

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school

enterprise government

1. Introduction

In many models of economic development, the development of the economy depends on human capital (talent). Schools can be viewed as the producers of such capital and enterprises as the consumers. Thus, strengthening the relationship between schools and enterprises is crucial to maintaining a dynamic balance between the supply and demand of talent and promoting the growth of the economy. In addition, the government plays an important role in facilitating the connection between schools and enterprises. For example, the German government has established a series of laws, regulations, and management systems to ensure that students can acquire theoretical knowledge in school and develop practical skills in enterprise <sup>[1]</sup>. The U.S. government has also passed the Strengthening Career and Technical Education (CTE) for the 21st Century Act to support partnerships among various schools and enterprises <sup>[2]</sup>, and the Chinese government has enacted Several Opinions on Deepening the Integration of Industry and Education to promote the supply side structural reform of talent and improve the synergy of educational resources and regional industries <sup>[3]</sup>. Promoting close and sustainable cooperation between schools, enterprises, and government has clearly become an important concern in these countries.

However, the reality is that the cooperation between schools, enterprises, and government has not been very effective. This is due to the differences in goals and culture between schools and enterprises, as well as disputes over the ownership of intellectual property. The differences in organizational attributes and social functions of schools and enterprises lead to two types of social division of labor, which results in differences in the goals of both of these types of institutions <sup>[4][5][6]</sup>. The goals of schools include cultivation, education, and theoretical research, and the primary goal of enterprises is to maximize profits. These differences in goals also lead to differences in culture between schools and enterprises, such as in organization and management, behavioral patterns, and approaches to schedules <sup>[Z][8][9]</sup>. In addition, there are some differences regarding the ownership of intellectual property. For example, researchers at schools tend to publish research results in order to increase their influence and push the frontier of knowledge, but enterprises are incentivized to keep their core technology and know-how

secret in order to monopolize the market <sup>[10]</sup>. All these factors can impede the cooperation between schools, enterprises, and government.

## 2. School–Enterprise Cooperation

The cooperation between schools and enterprises has been explored extensively in the existing literature. Many scholars have already investigated various school–enterprise cooperation models, such as the Dual System, Cooperative Education, and Sandwich Courses.

The Dual System is considered to be the driving force of Germany's post-war economic recovery and has become an exemplary case of school–enterprise cooperation. Theuerkauf and Weiner summarized five major characteristics of the Dual System, including a broad basic education, combined technical training and theory, training directed at acquiring key qualifications, a standardized system, and a planned change from schools to the training system <sup>[11]</sup>. The Federal Ministry of Education and Research of Germany (BMBF) has also published a book to introduce the origins, features, and training processes of the Dual System in detail <sup>[12]</sup>. Pleshakova analyzed the genesis and development of the Dual System in Germany from a historical perspective <sup>[13]</sup>. Given the advantages of the Dual System, some scholars have discussed the practice of Dual System in countries other than Germany, such as Russia <sup>[14][15]</sup>, Ukraine <sup>[16]</sup>, and China <sup>[17][18][19]</sup>. However, there are also some weaknesses with the Dual System. Pritchard pointed out that the Dual System is permeated with tensions emanating from individuals, schools, firms, and various influential interest groups <sup>[20]</sup> that can limit competition in the labor market, delay adult status in the labor market, and fail to guarantee employment <sup>[21]</sup>.

Compared to the German Dual System, in which the government and enterprises are deeply involved, American Cooperative Education and British Sandwich Courses are driven by schools, with little responsibility from government or enterprises <sup>[22]</sup>. Cooperative Education is a model of school–enterprise cooperation in America that refers to an educational program that combines classroom learning with work experience, and Younis and Pierrakos et al. argued that Cooperative Education is essential for both students and society <sup>[23][24]</sup>. Cooperative Education has also been found to have a positive impact on students' early career success and self-efficacy <sup>[25][26]</sup>. Students who enroll in Cooperative Education programs can learn professional knowledge and skills and gain practical on-the-job experience <sup>[27][28]</sup>.

Sandwich Courses are a British model of school–enterprise cooperation that involve a pattern in which periods of school study alternate with periods of industrial training or experience <sup>[29]</sup>. Sandwich Courses have been recognized as an effective method for accumulating sustained, structured work experience and improving employment chances <sup>[30][31][32]</sup>.

The motivations and factors of cooperation between schools and enterprises have also attracted the attention of scholars. Lee and Win (2004) summarized the motivations of schools in cooperating with enterprises, such as assessing the needs of the economy and developing talent accordingly, placing students in industry to connect classroom learning with practical experience, conducting both fundamental and applied research, accessing

protected markets, enhancing the business stature, improving the implementation of new technology, developing new products and patents, and saving production costs <sup>[33]</sup>. Arza (2010) divided the motivations of schools into economic motivation and research motivation <sup>[34]</sup>. Similarly, Lam (2011) argued that "gold", "ribbons", and "puzzles" are the motivators of researchers in schools for cooperating with enterprises and found that few academic researchers are driven by economic motivation <sup>[35]</sup>. Reducing transaction costs <sup>[36][37]</sup>; obtaining human capital, technology, education, and equipment <sup>[38]</sup>; and establishing a network of cooperation <sup>[39]</sup> have all been argued to be motivators of enterprises to cooperate with schools. Moreover, the factors influencing the cooperation between schools and enterprises, such as the scale of schools and enterprises <sup>[40][41]</sup>, trust and mutual benefits between schools and enterprises <sup>[42][43]</sup>, and culture differences <sup>[44]</sup>, have also been widely explored in the literature.

However, the previous literature on models, motivations, and factors has focused on schools and enterprises. Although it has been realized that the government plays a crucial role in school–enterprises cooperation and a few scholars have proposed that the government should formulate some policies to facilitate cooperation between schools and enterprises <sup>[11][12]</sup>, the government has not been considered as the main party in the cooperation between schools and enterprises. The influence of the government on the cooperation between schools and enterprises has been ignored.

In addition, evolutionary game theory is an effective tool for analyzing the strategic interactions between different parties <sup>[45]</sup>, and has been used in various disciplines, including economics <sup>[46][47]</sup>, public policy <sup>[48]</sup>, and environmental science <sup>[49][50][51]</sup>. Some scholars have also introduced evolutionary game theory into education. For example, Zhu and Wang (2022) built an evolutionary game model involving government, universities, and students to explore the development of the choice between innovation and entrepreneurship in education <sup>[52]</sup>, and Li and Wang (2022) discussed the management of primary and secondary school students' online learning during COVID-19 lockdowns by constructing two game models involving "schools and students" and "schools, students, and parents" <sup>[53]</sup>. Zhang and Zeng (2022) analyzed the manifestation of both the instrumental and human value of education for sustainable development, and proposed that a country's curriculum on sustainable development should start from concrete education issues that urgently need to be solved within the theory of sustainable development <sup>[54]</sup>. However, evolutionary game theory has rarely been used to research the cooperation between schools and enterprises.

To sum up, although the above research has provided some theoretical and methodological support for the study of cooperation between schools, enterprises, and government, there are still some shortcomings. (1) There are very limited studies that use evolutionary game theory to analyze the cooperation between schools and enterprises. (2) The role government plays in this cooperation has yet to be sufficiently revealed.

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