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Chapter 10

The Way of Building Human Capital in China

Małgorzata Wróblewska and Maria Bernat

Additional information is available at the end of the chapter

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Abstract

The current global economic expansion aims to strengthen China's economy and its economic and political system both domestically and internationally. The recommendations of the PRC authorities are unequivocally expressed in propaganda slogans published in the media. The slogans suggest that people seek to compete with each other in business and science, to create thriving businesses, and to develop their own careers. To this end, people should be educated. The educated human capital is to provide the PRC with a high competitive advantage in the high-technology industry and support the development of the innovative knowledge-based service field. In order to achieve this, a balanced support for the education of young people both in the humanities and in the sciences is required. Therefore, the ideas outlined in the following paper refer to concepts based on human capital and its impact on the innovativeness of the economy. The purpose of this publication is an attempt to identify selected determinants of human capital development, the quality of which influences the innovativeness of the economy of the People's Republic of China. Among the most important are the education and activities undertaken by the PRC authorities. It is, according to the authors, human capital that could develop faster when surrounded by the innovation economy and if a number of reforms were undertaken to improve human capital's quality. In order to verify this thesis, studies of subject literature were conducted, and selected analyses in education and innovation were conducted.

Keywords: China, education, innovation, human capital, business culture, economic development

1. Introduction

For hundreds of years, the Chinese Empire was the most economically and technologically developed region in the world. The Chinese dominated other civilizations in areas such as

water engineering, pottery, communication, navigation, agriculture, crafts, shipbuilding, transportation, military equipment and technology, textile, mining and natural resource processing, and many more [1].

During the nineteenth century, China did not participate in the industrial revolution, which changed the global economy by providing Europe with a competitive advantage over other regions of the world. At that time, the Middle Kingdom was riddled with internal conflicts and shut off from the spread of innovation from abroad. The devastation of the Chinese economy was also caused by their engagement in costly wars, which suppressed China's economic and technological development. Mao Zedong's government and his utopian social and economic programs further plunged China into stagnation. The potential of the largest nation in the world was unlocked by the reforms of Deng Xiaoping in the late 1970s. Since then the PRC has sought to restore its status as the world's largest and most innovative economy [2].

One cannot forget the geographical size of the area and the enormous size of the population living in the Middle Kingdom, which is reflected in the grand scale of all social and economic undertaken activities.

M. Elvin formulated the theory of the "high-level equilibrium trap," which is an interesting explanation of China's delayed development during the period of rapid development within European countries. According to Elvin, the Chinese economy was advanced enough to fully meet the needs of society, especially its elite. The elite of Chinese society included highly qualified human resources, probably reinforced by a competitive exam system. The easy-to-access and cheap labor force reduced motivation for applying solutions which would both help to automate work processes and encourage the design of machines capable of replacing workers. An efficient transport system, which made use of rivers and canals, boosted trade rapidly, making all sorts of goods available even during crop failures and natural disasters. The large market enabled the sale of virtually every manufactured product providing a disincentive for reducing production costs to fight off competition. The size of the country allowed for the acquisition of new farmland without the need to significantly increase its crop yields. Increased crop yield could be achieved through investments in better hydration systems and the purchase of more efficient machinery or improvements in infrastructure. The wealth and intelligence of the elite, the ready availability of human resources, and relatively high levels of development may have hindered China's further development during this era. Unlike China, European countries such as Poland and Germany suffered from the lack of the ample labor force required for production of goods. Lack of an adequate labor force required these countries to search for solutions which would automate work processes. Additionally, strong competitors enforced cost reduction and improvement in product quality. The relatively insufficient amount of arable land stimulated the increase of productivity in agriculture and the lack of a waterway system which would support trade contributed to the emergence of a steam engine and the development of railways [3, p. 53].

Therefore, the ideas outlined in the following text refer to concepts based on human capital and its impact on the inattentiveness of the economy. The aim of this publication is an attempt to identify selected determinants of human capital development, the quality of which influences the inattentiveness of the economy of the People's Republic of China. Among the most

important are the historical factors, education, and the actions of the PRC authorities. It is a research thesis that human capital could develop faster and more strongly in the innovation economy if a number of reforms were undertaken to improve its quality. In order to verify this thesis, literature studies were conducted, and interdisciplinary studies were carried out.

2. Education as a factor in the development of human capital in the PRC

Referring to individual skills and abilities as an element of nation's prosperity dates back to the fifteenth century when W. Petty attempted to measure human capital by means of accumulated remuneration at the national economy level. Over the centuries, the methods of estimating human capital have changed, while the way of defining it today as "knowledge, skills, abilities and other attributes of the individual who are important in economic activity" [4, p. 9] or defined as "the knowledge, skills, abilities and other qualities of the human individual that enable the generation of personal, social and economic welfare" [5, p. 18] does not differ significantly from the definition of A. Smith, who understood human capital as "all useful skills acquired by the inhabitants of a given country" [6, p. 2].

The above definitions make the direct measure of the "resource" of human capital impossible, as human capital can only be estimated through measurable phenomena in statistics and proxy measures and index combinations of these measures.

W. Petty, mentioned above as the precursor of investigating human capital, tried to determine the value of man by age, health, and skills. However, he believed skills are as important as production factors: work, land, and capital. Petty considered human labor as the source of the country's wealth [7, p. 31]. A. Smith also considered skills and qualifications acquired by people as a form of capital. According to Smith the costs of education and training of employees are an investment in their future earning opportunities. Such investment, similarly to the investment in physical capital, should return during the employee's professional life [8, p. 227]. Also other great economists such as D. Ricardo [9] J.B. Say and A. Marshall [10, p. 207], or S. Mill and F. List [11, pp. 11–13] emphasized the importance of human resources, knowledge, and education.

These theories influenced the development of the theory of human capital in the late 1950s and continue until the present day. T. Schultz became the pioneer researcher of individual economic efficiency of education. He limited the measurement of human capital to education due to its investment character. Schultz believed that education raises man's ability to work; therefore, investing in human capital could enable poor people and states to grow and increase their income [12, pp. 18–42]. Further studies were carried out by E.F. Denison, who tried to measure classical factors of production and education for economic growth in the United States between the years 1909–1929 and 1929–1957 [13]. G.S. Becker also made many important findings for the theory of human capital. According to him education can be seen as an investment that brings the learner a certain rate of return considering three components: time, consumption, and investment in education. He has also developed models for analyzing return on investment in various types of workplace training [14]. The influence of growth

of knowledge, skills, and productivity of employees on economic growth was also examined by H. Uzawa. Like E.F. Denison, Uzawa used the modified model of R. Solow, assuming that jobs and capital are the driving forces for economic growth. Labor efficiency can be increased through education, health care, infrastructure, and maintenance. R. Lucas developed Uzawa's model. According to Lucas sustainable economic growth is possible through investment in both physical and human capital. It is also important to invest all savings. The greater the economic growth, the higher the savings, including investment in human and material capital [15, p. 14].

People should increase their savings so that they could invest in physical capital or invest in their own development, e.g., education and professional development. R. Lucas believed that economies with low human and material capital are capable of "catching up" the economies of highly developed countries only by changing their consumption preferences.

This model of Lucas explains to some extent the very rapid development of the Chinese economy since the late 1970s. The Chinese earn low wages but have a very high propensity to save. Therefore, the Chinese banking system accumulated financial resources that could be used to build physical capital and developed education and science [3, p. 17].

Both the works of classics and modern representatives confirm that human capital is important for economic development of countries. The development of economic thought helped in creating models that clearly point to the merits of investing in the development of human potential, both for the benefit of individuals and for countries.

3. Education in the People's Republic of China

According to Gawlikowski, the current economic system in China may be defined as "state capitalism," characterized by extensive state interventionism in the market economy [16, p. 53]. At the same time, the Chinese succeed in maintaining both communism and capitalism without recognizing the apparent contradiction. This phenomenon may be explained in several ways. Firstly, the rise of the People's Republic of China has been perceived by the Chinese primarily as liberation from Western colonialism rather than the creation of a new economic system. Secondly, the attitude of the Middle Kingdom's inhabitants toward the established economic system can be defined as an instrumental approach. The Chinese are searching for the most useful and effective economy.

However, the Chinese do not perceive the nature of the economic system as essential when it comes to determining the nature of the state. That is how the PRC entered the global markets, by accepting economic globalization while at the same time rejecting political globalization. Many Chinese believe that economic integration with Western countries does not require the adjustment of the Western political and social standards.

In China, one can run a business, accumulate wealth, and pursue one's own economic goals, as long as doing so does not jeopardize government policies or the stability of state power. Therefore, competition has a definite framework. Governmental recommendations expressed

explicitly in propaganda slogans presented in the media suggest that people ought to work on personal development for the benefit of the entire of society. Chinese people have to compete with each other in business and science, create thriving businesses, and develop their own careers. To this end, people should be provided with good general upper secondary education in order to create a society in which everyone continues to learn throughout their entire lives. These activities are intended to foster long-term development in all areas of economic and social life, including significantly increasing efficiency, and put the whole of society on a path that will develop their civilization and ensure the growth of their national production, thereby leading to a more prosperous life for all [17, p. 98].

Research conducted in various parts of the PRC indicated that education is crucial for the economic development and innovation of the country. Studies carried out by B. Fleischer, H. Li, and M. Qiang illustrated the strong influence of education on China's development. Their results revealed that Chinese workers who graduated from secondary school are much more productive than those who did not receive such education. The research also demonstrated that higher education contributes to the spread of knowledge and the growth of technology, which significantly supports innovation. In the less developed provinces of China, investment in education may have a more significant impact on economic growth than on infrastructure. Therefore, it is highly recommended for all provinces to invest in human capital as a way to reduce the gaps in the economic development within the PRC [Fleischer B., Li H., Qiang M., 201, p. 229].

In order to change China's competitive position, many reforms of higher education were undertaken so that not only low production costs but also well-educated people and innovative enterprises drive the economy. The reforms aimed at increasing the availability of education for Chinese citizens because by the end of the 1970s, the number of Chinese students aged 18–22 was less than 1%. The results of the changes in education appeared slowly. Between 1984 and 1993, this share ranged between 2 and 3%. By contrast, after 1994, there was a sharp increase in the number of students; in 2003, the proportion of students aged 18–22 was around 20%; and in 2013, their share was up to 29.7% [18].

Between 1991 and 2014, the annual average increase in budget expenditure on education in the PRC reached 17.74% of the country's total budget. The share of budget expenditure in financing education in China over the past 10 years increased from 61.66% in 2004 to 80.53% in 2014 [19].

This budgetary increase illustrates the degree to which the authorities of the Middle Kingdom understand the importance of education to overall national economic development. However, according to the data due to the large number of students, these expenses are insufficient. In 2012, the annual cost per student in China was USD 6.500, while in other countries, the ratio was much higher. For example, in the United States USD 26.400, the United Kingdom USD 13.400, Brazil USD 10.200, or South Korea USD 8.500 [20].

The Chinese authorities have recognized the importance of education for the development of innovation and launched the National Reform of the Education System for the years 2010–2020, which, among others, cover the founding popularization of secondary education and

increasing enrollment in secondary schools to 90% of the population and increasing the number of people attending higher education by 16% or 35 million to make up 40% of the population [21, p. 55].

The implementation of such educational policy provided by the state authorities seems to have noticeable effects of improving human capital. Until recently, large and seemingly huge gaps appeared between China and the most advanced countries in science and independent and significant scientific discoveries. The Middle Kingdom to a great extent had to rely on the innovation and achievements of other countries. The dynamic growth of Chinese companies employing engineers supports the method of developing human capital. Such organizations are getting better and better as compared to their foreign competition both in the internal market and abroad. For example, in 2014, the third most innovative corporation in the world according to Fast's ranking was Chinese Xiaomi. The company, founded on April 6, 2010, produces mainly mobile phones. From 2011 to 2016, Xiaomi's engineers developed 21 models of new high-tech smartphones. Such remarkable success of the company would not have been possible without the support of many specialists educated within the Chinese education system. Why? Because Chinese companies have nearly no ability to recruit workers from abroad: firstly, due to the low wages they offer and secondly because of the law restricting the ability of foreigners to settle and work in China. Therefore, it is legitimate to create adequate human capital in China. In the EU countries, the development of innovative economies is possible when employing a large number of educated professionals within the European Union. International companies have global access to human resources because of attractive remuneration and effective immigration policies of the respective governments (e.g., Germany and BMW) [22, p. 68].

It is generally believed that engineers are crucial to a society's technological development. However, the patent applications from Chinese graduates in engineering, manufacturing, and construction are only ranked fourth in the world in terms of their total number of patent applications. There is no doubt that engineers and builders influence inventions and technological advances, but their training cannot be the country's only strategy for promoting innovation through education. A few years after their graduation, graduates in the fields of the social sciences, economics, and law may also prove to be important for the innovative economy. Unlike graduate engineers, who have the knowledge and ability to take part in research immediately as they enter the profession, graduates in such fields as management, rarely, have the opportunity to directly create or support innovation immediately after graduation. Only when graduates advance to positions where decision-making is strategically important can their significance be noticed. Similarly, graduates in pedagogy must wait a full 8 years beyond their graduation before they can have any real influence on their country's number of patent applications. Only after such time can the results of their work as teachers become noticeable as their students go out into the labor market. The number of patent applications is not correlated with the number of agricultural- and service-related graduates [3,p. 84].

The development of human capital as a way to create a competitive advantage in high-tech industries requires a balance of support for the education of young people in both the humanities and the sciences. It is only then that the development of technological innovation will begin to show have a significant impact on innovative- and knowledge-based services.

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4. Innovation in the People's Republic of China

The innovation of the economy is difficult to measure as it is difficult to define the direct effects of innovations being introduced. For this reason, different methodologies and a variety of measures are used to measure innovation. The most commonly used innovation measure is patent applications and patents.

In 2009, the number of worldwide patents issued in China reached 5%, compared to 50% of patents registered to the United States [17,p. 213]. However, in the years 2009–2011, 74% of the total global increase in the number of patent applications was filed in China. Moreover, the number of patent applications in China increased by 28.48% between 2002 and 2014 [3, s. 162]. In 2011, more than 2 million patent applications were filed among which 526,412 were filed in China, 503,582 were registered in the United States, 342,610 were in Japan, and the distant fourth was South Korea with a much smaller claims. The above data illustrates the changes in the "geographical structure" of innovation. In the second half of the twentieth century apart from the United States, Germany and Japan were the only other countries that took the first place in the number of patents issued worldwide [23, p. 119].

Despite the considerable number of patent applications, Chinese still do not dominate among numerous patents granted. The difference between the number of applications and the number of patents granted to citizens of the PRC is caused by poor quality of many applications.

Another measurement tool for economic innovation is the registration of industrial and utility models. This is increasingly important because often it is not due the usefulness of a given product or the technology used to produce it. Many products are competitive and innovative because of their attractive design. Therefore, more and more companies are reserving these solutions to avoid duplication by competitors. Prior to China's entry into the WTO in 2001, intellectual property rights were poorly protected [Liu and Zhou, 2012, p. 7]. Over time, Chinese authorities increasingly require companies to respect international law. Since 2001 China significantly increased the number of protected designs in China, and in terms of product designation, China is a world leader. For example, in 2014, China registered 701,246 utility models, and Russia 12,557, Germany 10,389, Japan 8947, South Korea 5043, and the United States 2919 [24]. The question remains open whether the claimed usable and industrial designs are indeed innovative and bring significant benefits to the economy. So far, there are few Chinese companies that have the advantage of having a proprietary design in gaining competitive advantage.

It is worth noting that the hierarchy of Chinese companies influenced by both the Confucian philosophy and the belief in the collectivism of all human activities negatively affects innovations. These features of Chinese culture stifle the initiative of employees and discourage the development of individual innovative ideas. However, the Chinese are quite tolerant of the uncertainty inherent in projects related to change and innovation. Such a tolerance has a positive and significant influence on innovation and growth. The long-term orientation of the majority of Chinese people can influence innovation both positively (through the long-term thinking about business development) and negatively (by holding onto financial reserves that might be better used to support R&D) [3, p. 122].

5. Conclusion

China's current global economic expansion aims to strengthen China's economy and Chinese economic and political system in both internal and external markets. The PRC declares that it does not intend to impose anything on outsiders or to interfere in internal affairs but rather to use the global wealth without changing the existing international order [25, pp. 39–40]. Nevertheless, China as a "revolutionary power" has an increasingly strong impact on the global environment in which it operates and, at the same time, the outside world also contributes to the transformation of China.

Acting carefully, China has become the world's largest manufacturer, and Chinese products have been flooding international markets for several years. This process has contributed to the elimination of many jobs in the United States, the European Union, and Japan. Large western corporations as well as medium and small companies have moved and continue to transfer more of their production to China [Kania, 2010, pp. 39–58]. At the same time, these companies use their most up-to-date technologies to increase their competitiveness in the Chinese market. However, most foreign companies have already discovered that their increased emphasis on innovation in China does not improve the attractiveness of their products or services due to the lack of effective protection of intellectual property in the PRC. Organizations that have built their divisions in the PRC and have implemented some new technologies quickly find out that sooner or later the Chinese will copy and use this technology as their own. It is also difficult to compete with the low cost and large scale that underpin the competitive advantage of Chinese entrepreneurs. The Chinese are neither ruthless nor very aggressive. They are conservative and slow but at the same time very hardworking. They learn from mistakes, invest a lot, and constantly think about growth [26, p. 22]. There are two elements to be improved in terms of educational investments for human capital development in China. In 2015, the number of university admissions decreased, and some of the Chinese universities have not fully used their capacity. For many young Chinese, a major obstacle to study is the fees for studying and the costs of staying in university cities. It is necessary to expand the scholarship system for the poor and outstanding students. The easier access to low-interest bank loans and the possibility of repaying them after graduation may also support higher education. Secondly, there is no tradition of employee training organized by employers. The results of the research conducted in nine Chinese provinces and based on a group of ten thousand employees showed that only 45% of employees were trained at the workplace and only 39% received training before starting to work. Therefore, the Chinese government introduced a number of training programs for employees who had moved from rural to urban areas and workers from state-owned enterprises. However, there is no data available as of yet on the effectiveness of this project [3, p. 74].

Switching to a more cost-effective model (limiting credit policies, decreasing export earnings, or increasing labor costs) and focusing on internal needs may require a change in production organization, the production and the education of employees all of which can take up to as many as 10 years [23, p. 14]. The Chinese authorities are fully aware of it.

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