High-quality Development and Workforce Quality Improvement

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Introduction[1]

Since the 19th National Congress of the Communist Party of China, Chinese economy has maintained a steady and sound development momentum; has significantly improved its economic structure, development efficiency, people's livelihood and labor market stability; and has laid a solid economic and social foundation for improving the quality of workforce. Firstly, the economic structure has been constantly optimized. As of June 2018, China's GDP reached 4189.61 billion yuan, with a year-on-year increase of 6.8%. The tertiary industry value-added increased by 7.6% and its contribution to economic growth was up by 1.4% and was 78.5% higher than the secondary industry, demonstrating the strong stimulus of the service industry to economic growth; the final consumption expenditure contributes 78.5% to GDP growth, up by 14.2% compared with the same period of last year, fully exhibiting the primary role of consumption in economic development. Secondly, the quality and efficiency of economic development has been remarkably improved. The value added to high-tech industries increased by 11.6% year on year, by 9.2% in equipment manufacturing industry, and by 8.7% in strategic emerging industries. Digital economy and related industries have maintained rapid development. Thirdly, people's livelihood has been continuously and steadily improved. The per capita disposable income of residents throughout the country reached 14,063 yuan, with a real increase of 6.7%.

At the same time, the overall situation of labor market has remained stable. By the end of 2017, 776.4 million people were employed nationwide, with 370,000 new

[1]I have received support and assistance from the Department of Employment of the National Development and Reform Commission, the International Cooperation Center of the National Development and Reform Commission, the China-EU Social Security Reform Project, and experts and scholars from the European Union in the process of writing and revising this report. They provided valuable suggestions for revision and perfection of this report during my two presentations respectively on June 27th and September 13th and during daily communication. I hereby express my sincere gratitude to Tong Siyun, Chen Jun, Zhang Xinmei, Tang Ling, Niu Ming, Chang Hao and other officials from the Department of Employment of the National Development and Reform Commission, to Wang Rong, Michele Bruni (EU) and Jean Victor Gruat (EU), Marzena Breza (EU), Zhang Guoqing, Fang Lianquan, Shi Chuan, etc. from the China-Europe Social Security Reform Project Team, as well as Ann Coenen (Belgium), Agnieszka Majcher-Teleon (Poland), Véronique Dunaud (France), Jean-Yves Hocquet (EU) and other experts.

workforces added to the market during the whole year. Among them, 424.46 million people were employed in urban areas, with an increase of 10.34 million over the end of the previous year; the rural migrant workforce in cities nationwide totaled 285.52 million, up by 1.7% over the previous year. By the end of June 2018, a total of 430 million people were employed in urban areas, with an increase of more than 5 million since the end of 2017. China's urban surveyed unemployment rate remained lower than 5.1% and that of rural migrant workforce remained within the range between 4.3% and 5.0%[2]. Compared with the average level of employment in the EU during the same period, the overall employment situation was basically desirable and the labor market could adequately and stably provide high-quality workforce.

Statistics show the overall employment situation has developed in accordance with the fundamental assessment made in the report delivered at the 19th National Congress of the Communist Party of China that China's economy has been transitioning from a phase of rapid growth to a stage of high-quality development and that the trend of high-quality development has continued. In this context, in order to fulfill the requirements for deepening supply side structural reform, constantly optimizing economic structure, developing such emerging industries as digital economy, promoting the synergic development of new-type industrialization, informatization, urbanization and agricultural modernization and achieve more sustainable development with higher quality, efficiency and fairness, it is necessary to continuously promote the all-round development of workforce and build workforce with comprehensive quality, high-level education, professional skills and extensive training experience. Such workforce can serve as the basis for industrial transformation and consumption upgrading, the supply of products and services, the implementation the new development philosophy and the building of a modern economic system.

[2]According to the statistics of the National Bureau of Statistics, the indicators of China's economy in the first half of 2018 have improved compared with the same period of last year. The investment structure has been continuously improved, the consumption structure has been effectively upgraded, the consumer price nationwide has been running smoothly, the income of residents has grown steadily, the employment situation has been stable, and the overall economic situation is growing steadily. Read the full report in: http://www.stats.gov.cn/tjsj/sjjd/201807/t20180717_1610395.html。

In order to improve the overall quality of workforce, improve their education level and skills, and intensify their training against the backdrop of high-quality development, it is necessary to correctly grasp the new development philosophy, identify the gap between the workforce building and the demand of high-quality development, fully draw on the domestic and international experience in improving workforce' quality, and systematically improve the quality of workforce through the effective combination of government policies and market regulation.

As to methodology, this report analyzes the specific requirements that high-quality development imposes on the improvement of workforce, takes the new human capital theory as a basis, focuses on the core factor of human ability and examines the gap between such conditions as physical quality, mental health, education level and skills and the requirement of high-quality development. In the chapter of policy suggestions, this report refers to the human capital life cycle theory, targets problems existing in physical quality, mental health, education level and skills and views the problems from different perspectives to provide systematic suggestions that accommodate actual conditions, address the symptoms of problems and accord with the requirements of development.

In this order, the first part of the report will review the economic development policies at different stages since the founding of the People's Republic of China, examines their correlation with high-quality development and explore the connotation of high-quality development based on relevant international experience. In the second part, this paper compares the requirements that high-quality development imposes on the improvement of workforce and the current workforce building and identifies the gap. In the third part, this paper focuses on the international experience in improving the quality of workforce in the context of high-quality development and provides references and pathways for policy recommendations. In the fourth part, this paper will provide policy suggestions from various perspectives such as the overall quality of workforce, education, school-enterprise integration, skills upgrading, employment promotion, infrastructure and rationalization of government-market relations.

1. High-quality Development Echoes the New Development Philosophy

It is explicitly pointed out in the report delivered at the 19th National Congress of the Communist Party of China that "a new vision of development should be applied to develop a modernized economy" and that China is currently at a pivotal stage for "transforming growth model, improving economic structure and fostering new drivers of growth", which is particular in terms of industrial system development and economic system building and is in line with the economic development during the previous stage.

1.1 High-quality development is the inevitable result of the historical evolution of development model

In the process of reviewing the history of China's macroeconomic policies and development models, the research group believes that high-quality development is the inevitable result of the evolution of China's development models in different periods, and that it is a historical process shifting from problem-oriented to development-oriented. In chronological order, the development has gone through three stages of exploration, concentration and new era; in terms of goals, it started with the building of a complete industrial system, gradually transformed into promoting economic growth and all-round social development, and finally targeted to finish the building of a moderately prosperous society in all respects and turn China into a modern socialist country in an all-round way; in terms of the specific content, it has shifted its focus from industrialization to economic growth, further to optimization of economic structure, and eventually to the new development philosophy.

1.1.1 Stage of exploration

This mainly refers to the stage of industrialization and socialist transformation from 1949 to 1957.

The identification of the direction and tasks of New China's economic

development can date back to the 7th National Congress of the Communist Party of China in 1945. During the congress, the economic goals after the establishment of the people's government were elaborated[3] as "upon obtaining political conditions of the new democracy, the Chinese people and their government must take concrete steps to establish heavy industry and light industry in a few years and turn China from an agricultural country to an industrial country"[4]. The subsequent 1954 *Constitution* also proposed the development goal of "transforming from an agricultural country into an industrial country". In addition, socialist transformation was simultaneously underway, together with the implementation of policy of "prioritizing the establishment and development of heavy industry on the basis of industrialization".

The industrialization and socialist transformation in this period were highly relevant to the social and economic situation of the newly-founded China. The industrialization targeted to address China's weak industrial base and the challenge of the external crisis facing the Northeast, and meet the need for an industrial system that bolstered the economy and national defense. At the meantime, the public ownership economic system established as a result of the socialist transformation created conditions for the establishment of a highly centralized political and economic system. Considering the historical background, the development model was an outcome of drawing on the Soviet model as well as an inevitable choice made by the Communist Party of China to rapidly develop its economy while accommodating its national conditions.

1.1.2 Stage of concentration

This refers to the stage between China's reform and opening up and entering a new normal of economic development from 1979 to 2013.

This stage has witnessed a greater role of the market mechanism. In the 12th National Congress of the CPC, it was proposed to "correctly implement the principle that the planned economy plays the major role and the market regulation plays the

[3] Thoughts on Economic Development Modes in the Two Historical Periods Before and After Reform and Opening Up, Collected Papers of the 15th National History Academic Annual Meeting, January, 2017, Source: http://www.cssn.cn/ddzg/ddzg_ldjs/ddzg_jj/201701/t20170124_3396990.shtml

[4] Selected Works of Mao Zedong, Volume Three, People's Publishing House, 1991 Version, Page 1081

supplementary role"; in the 13th National Congress of the CPC, it was proposed that "the socialist planned commodity economy system should inherently integrate planning and the market"; in the 14th National Congress of the CPC, it was proposed that "in the socialist market economy, market should play a fundamental role in resource allocation under the macro-control of a socialist state, so that economic activities abide by the law of value and adapt to the change of supply and demand; and that through the price leverage and competition mechanism, resources should be allocated to the activities with better benefits...to promote the timely coordination of production and demand". These changes of elaboration demonstrate the more prominent role of market mechanism in the development of national economy.

The introduction and deepening of the market economy has driven the rapid development of the national economy. This stage witnessed the growth of China's GDP at an average annual rate of 9.75%, which was inextricably attributed to market economy and activated market players. In 2013 when the Chinese economy entered a stage of steady development, the new normal in economic development emerged and urged the CPC and China to shift the mode of economic growth. A prototype of high-quality development has thus taken shape.

1.1.3 Stage of a new era

This stage has started since 2014, which is special with distinct features of a preparatory stage.

In May 2014, Xi Jinping initiated the concept of new normal for the first time. In September of the same year, he systematically elaborated on the concept, opportunities and key links of the new normal. Xi Jinping deemed that despite of the slower pace of economic growth, the economic growth boasted stationary trend, optimized structure, a diversity of dynamics and considerable increment. He pointed out that "improving quality and efficiency should be pursued as the centerpiece of economic development". The subsequent 13th Five-Year Plan identified the overarching goal of "maintaining high-speed economic growth" [5]and highlighted the

[5]Xinhua News Agency, The 13th Five-year Plan for Economic and Social Development of the People's Republic of China,2016-3-17, Source: http://www.xinhuanet.com/politics/2016lh/2016-03/17/c_1118366322.htm。

need to make the economic development more balanced, inclusive and sustainable.

The new normal essentially means the innovation of GDP growth mode[6]. As an important component of the economic policy in the new normal, addressing overcapacity has acted as the prelude to the supply-side structural reform, which is one of the measures the CPC and China have adopted in response to the changes of economic development situation. The tasks to "cutting overcapacity, destocking, deleveraging, reducing corporate costs and shoring up weak spots" could be understood as a direct measure to cope with the falling market price of raw materials and a necessary measure at the stage to achieve the transformation of economic growth. The purpose is to phase out backward production capacity and open up space for high-quality production capacity and innovative development.

In October 2017, the report delivered at the 19th National Congress of the CPC stated that socialism with Chinese characteristics entered a new ear, which represented a new historical stage of China's development. The report pointed out that we must continue commitment to people-centered philosophy of development, promote well-rounded human development, ensure and improve living standards through development, ensure harmony between human and nature, and promote the building of a community with a shared future for mankind. In terms of specific development models, the report proposed to "apply a new vision of development and develop a modernized economy". The new vision of innovative, coordinated, green and open development that is for everyone should be implemented through furthering supply-side structural reform, making China a country of innovators, pursuing a rural vitalization strategy, implementing the coordinated regional development strategy, accelerating efforts to improve the socialist market economy and making new ground in pursuing opening up on all fronts.

Entering a new era is a conclusion based on the profound and fundamental changes in economic development since the 18th National Congress of the CPC and a comprehensive and accurate judgment of the CPC and the Chinese government on

[6]Chen Shiqing, What is the New Normal Economy? Qiushi Theory Network ,2015-3-19, Source: http://www.qstheory.cn/laigao/2015-03/19/c_1114688943.htm。

social and economic development. The vision of new development is put forward to address such challenges as the lack of drivers of economic innovation, imbalance in regional development, severe environmental pollution and insufficient openness. The vision serves as an important principle guiding the construction of a modern economic system.

Reviewing history of the development models, we find that the previous two stages of exploration and concentration accumulate experience for the upcoming third stage as well as lay the economic and social foundation. Viewed from its content, the new normal period is a prelude to the new era. It emphasizes the elaboration on the means of economic development, prioritizes the high quality of economic development and educates the public about the relationship between the speed and quality of economic development, and thus serves as necessary preparation for entering a new era. In addition to the means of economic development, the new era imposes requirement on quality in all aspects of social and economic development and emphasizes high-quality development in all aspects, demonstrating progress in development philosophy after redefining principal contradictions facing Chinese society.

1.2 High-quality development is an effective practice of drawing on international experience

China’s development models have shifted by drawing on effective international practice. The people-centered concept of comprehensive evaluation of human social development represented by the United Nations Human Development Index is an effective measure to examine the overall development of workforce in the context of high-quality development. The concept of green and sustainable development advocated by the EU and OECD countries is highly consistent with the requirements of the supply-side structural reforms for green and low carbon development during the period of high-quality development. Such measures adopted by EU countries to promote comprehensive economic development as the responsible development strategy advocated by the Polish government aiming to pursue balanced development

among different nations are similar to the coordinated regional development strategy to be implemented during the high-quality development stage. Belgium highlighted labor market and other factors that influenced economic development in its economic outlook, which was helpful to rationalize the relationship between government and market upon the backdrop of high-quality development. The relevant policies and measures Germany's Industry 4.0 are of importance to the current transformation and upgrading of manufacturing industry represented by the smart manufacturing.

1.2.1 United Nations: Human Development Index (HDI)

The Human Development Index is a comprehensive indicator created by the United Nations Development Program (UNDP) based on the three basic dimensions of "long and healthy life, knowledge, and a decent standard of living". It is calculated according to certain methods and is published in the same year's *Human Development Report*. Since 1990, HDI has played an extremely critical role in guiding developing countries to formulate development strategies. The UNDP annually issues HDI of all the countries in the world and uses it as an indicator to assess the human development of the countries in the *Human Development Report*.

The HDI reflects the dynamics of human development, reveals a country's priority development and serves as a reference for countries in the world, developing countries in particular, to formulate their development strategies, thus conducive to tap a country's potential of economic growth. If decomposed, the HDI could uncover the weak links in social development and provide early warning for economic and social development[7]. It boasts the following advantages: 1. The HDI, which utilizes easily accessible data and is calculated with an easy method, believes that a comprehensive evaluation of a country's welfare should focus on human development rather than economic conditions; 2. HDI is applicable to different groups and able to, through adjustments, reflects differences in income distribution, gender, geographical distribution and ethnic minorities. By measuring the level of human development, HDI reflects the progress of a society and opens up a new way of thinking to evaluate social development.

[7] United Nations Development Programme，Human Development Report 2014. 24, July,2014.

In the *2016 Human Development Report*, China ranked 90th in 2015 (index: 0.738), Norway ranked first (0.949), Switzerland second (0.939), Germany fourth (0.926), Denmark Fifth (0.925), Netherlands seventh (0.924), Japan seventeen (0.903), Belgium twenty-second (0.896). While revealing the gap between China and other countries, the HDI also assesses such aspects as life expectancy at birth, expected years of education, average years of education and per capita gross national income and provides a practical direction for China to implement the people-centered development vision and consolidate and improve people's livelihood[8].

1.2.2 EU & OECD: sustainable development and green development

The European Union has prioritized sustainable development as an important policy in the Lisbon Strategy devised in 2000, which aimed to make the EU "the most competitive and dynamic knowledge-based economy in the world by 2010". To deliver this strategic goal, the Strategy took social cohesion, economic revitalization and sustainable development as three pillars that supported and propelled each other to create a better future for the Europe.

The cornerstone of the Lisbon Strategy was to unwavering embark on the path of sustainable development. Since UN's first Rio de Janeiro Earth Summit in 1992, the EU has taken a real interest in the disasters caused by the deteriorating world environment and actively formulated environmental protection policies in the region; it also increased investment and organized large-scale environmental research projects; it beefed up efforts in the publicity of environmental protection and engage public in various activities; and it promoted international cooperation and urged the international community to jointly combat the grave challenges posed by deteriorating world environment. Its main strategies and policies include: the 6th Environmental Action Programme, the White Paper on Growth, Competitiveness and Employment, Agenda 21 and the Sustainable Development Action Plans.

The EU believes that the fundamental way to address environmental problems is

[8] The Human Development Report 2019 mentioned that from 1990 to 2015, one third of the world population still live in low-standard conditions. Each country faces complex and overlapping disadvantages that increase vulnerability and intergenerational inequality. Please visit: http://www.undp.org/content/undp/en/home/librarypage/hdr/2016-human-development-report.html for the full text.

to push forward scientific and technological progress. The EU listed environment as an important area in its first framework programme in the 1980s, allocating a total funding of 260 million euros; in its 6th framework programme, environment was identified as a priority with a total input of 2.33 billion euros mainly devoted to such key research and development areas as Earth's change and ecosystems, sustainable energy systems and sustainable land transport. Recently, the EU has added a new scope of study on the scientific support for environmental policy, which will be mainly applied in environmental protection, transportation, agriculture and fisheries. The main goal is to assist policy makers in making the right decisions. In practice, the EU has implemented green and sustainable development in every bit of economic policies. Taking the European Inland Waterway Shipping as an example, this organization, with the commitment to reducing transportation energy consumption, reduces carbon dioxide emissions through technological transformation of the vessels to simultaneously achieve business growth and sustainable development. It aspires to champion sustainable development in the field of inland shipping with two programs including climate neutral transportation and green transportation[9].

In addition, the EU coordinated its member states to strengthen cooperation; encouraged and supported the exchanges of researchers; pooled the top-notch scientists and researchers to resolve key problems; engaged European investment banks in the R&D and innovation of new green technologies; provided more loans; assisted member states that are weak in economic development and scientific R&D capacities and directed their attention and efforts to the EU sustainable development strategies to prevent the environment of some countries from getting worse and create conditions for the balanced development of green technologies across Europe.

The OECD officially proposed the Green Growth Strategy[10] in 2011, aiming to fostering economic growth and development, while ensuring that natural assets continue to provide the resources and environmental services on which our well-being

[9] NPRC was established in 1935. It is the biggest cooperative active in European inland-waterway shipping. NPRC believes that inland-waterway transport is the greenest form of transport within Europe. It is determined to make the environment even greener by investing in catalytic converters and particular filters. For more information, please visit: https://www.nprc.eu/.

[10] OECD，The OECD Green Growth Strategy . 2011. Source: http://www.oecd.org/greengrowth/.

relies. Green growth is a strategic concept that seeks to coordinate of existing economic policies and environmental bearing capacity and achieve the common progress of the coherence of economic development and environmental protection. This strategy has attracted the participation of 46-member states, which prioritize environment. Though not entirely identical with "green" development highlight in China's high-quality development, EU's economic policies adopted to promote green growth are still worth learning.

In terms of achieving sustainable development, the OECD supports the United Nations to ensure the success of the 2030 Agenda for Sustainable Development. It has brought together the know-how, unique tools and experiences[11] and devoted to the following aspects:

Improving policy coherence. The multi-dimensional nature of the SDGs requires linkages across policy areas. The OECD addresses the multidimensional nature of diverse issues through a variety of horizontal projects and international initiatives. Its "Policy Coherence for Sustainable Development Framework" helps to identify synergies and trade-offs among economic, social and environmental policy areas. The SDGs provide a solid foundation for supporting resilient societies, dealing with humanitarian emergencies, and reducing risks of instability and shocks.

Promoting investment in sustainable development. The ambitious scope of the SDGs will require financing on an unprecedented scale. New resources must be tapped and commitments must be measured and monitored. Private investment is essential to deliver long-term sustainable development. The OECD Policy Framework for Investment is a comprehensive and systematic approach to improving investment conditions, an ideal tool for unlocking private resources. The OECD also works with developing countries on many fronts to support them in mobilizing domestic resources. Official development assistance (ODA), which is tracked and monitored by the OECD, will remain at the core of many developing countries' financing portfolios.

Supporting inclusive growth and well-being. The SDGs promise to leave no one

[11] OECD And the Sustainable Development Goals: Delivering on Universal Goals and Targets，OECD. Source：http://www.oecd.org/dac/sustainable-development-goals.htm.

behind, putting sustainable development in motion everywhere, for the benefit of all. The OECD Framework for Measuring Well-Being and Progress goes beyond GDP growth and is increasingly being used by developing countries to identify and assess development challenges. Other OECD projects, such as the Inclusive Growth initiative, the Multi-Dimensional Country Reviews, regional policy assessment programs, and youth inclusion and social protection projects in developing countries also incorporate well-being.

Ensuring the planet's sustainability. Successful implementation of the SDGs will require striking a balance between socio-economic progress, sustaining the planet's resources and ecosystems, and combatting climate change. OECD works with its members, partner countries and other stakeholders to ensure sound environmental management that supports the sustained achievement of economic development and prosperity, while delivering human security and resilience. For example, together with the World Water Council, the OECD has created a High-Level Panel on Financing Infrastructure for a Water Secure World. The OECD tracks international climate finance and is sharing its expertise on these flows, and on the implications of different methodologies for estimating climate finance.

Promoting partnerships. To implement the SDG goals and targets, governments all over the world, international and non-governmental organizations, the private sector and civil society will need to team up. Working together they can unlock the necessary financial resources, share technologies and create national capacities. The OECD provides a platform for dialogue and exchange. Together with UNDP it supports the Global Partnership for Effective Development Co-operation, which brings all stakeholders to the table to discuss development issues on an equal footing. Besides, specific measures are taken to strengthen data availability and capacity and facilitate follow-up and review.

1.2.3 Poland: Re-industrialization, business innovation, balanced development

On February 14, 2017, the meeting of the Council of Ministers of Poland

adopted the *Strategy for Responsible Development (2020)* [12], its mid-term development plan aiming to set a new vision and model for national development to address challenges facing the Polish economy. The prospective is extended up to 2030. The strategy is expected to achieve the following goals by 2020: per capita GDP is to reach 79% of the EU average and become almost equivalent to the EU average by 2030. In addition, investment growth will exceed 25%; the number of large and medium-sized enterprises will increase to over 22,000; R&D expenditures increase to 2% of GDP; and the growth rate of industrial output is higher than GDP growth.

The specific objectives of the Strategy are as follows: First, the Ministry of Investment and Development of Poland believes that the sustainable economic growth is increasingly driven by enterprises (organizations) of knowledge, data and organizational excellence. Therefore, it is necessary for Poland to adopt re-industrialization measures to increase the competitiveness of Polish enterprises on the domestic and foreign markets. While adding new medium and large-sized enterprises, Poland will provide small and medium-sized enterprises with optimal conditions for development, encourage innovativeness, and increase the investment rate and quality in the longer term. Secondly, in order to achieve territorially sustainable development and enhance social cohesion, while strengthening the regions struggling with difficulties, Polish government emphasizes the cultivation of human capital potential in the labor market and enhances the effectiveness and quality of the implementation of territorially targeted policies. Finally, to build effective state and economic institutions contributing to growth as well as social and economic inclusion, the Polish government has made it clear to simplify the law so that it serves citizens and the economy. It will create favorable external environment for business operation and development of citizens. Digital service will be adopted to build a comprehensive system involving social, economic and regional development.

The strategy has five pillars and a development fund, including re-industrialization, innovative business development, capital for growth, foreign

[12]Ministry of Investment and Development, Strategy for Responsible Development Until 2020, 2020. 2017. Source: http://www.miir.gov.pl/strony/strategia-na-rzecz-odpowiedzialnego-rozwoju/informacje-o-strategii/.

economic expansion, economic and social development and the Polish Development Fund (PFR). Among the five pillars, the area targets the improvement of workforce quality is re-industrialization (which supports the formation of new competitive advantages and specialization in the economic development) and social and regional development (which includes vocational education reform). The Polish Development Fund (PFR) is a key tool for the implementation of this strategy. The fund will integrate relevant existing institutions and their tools to form new financial tools and lay the economic foundation for the development of technology and education. The strategy will be implemented in programs. The *Strategy for Responsible Development* (2020) describes a variety of initiatives and measures, including over 180 strategic and flagship projects for the implementation of strategic objectives. It also establishes a coordination and implementation system that assigns tasks to various public entities and works with business community, science sector and society.

Additionally, we can see from the document officially published by the Ministry of Investment and Development of Poland, the Polish government is gradually upgrading the capacity of government departments to provide services, overcoming the adverse impacts of the so-called "Polish sector" and achieving the sound operation and overall coordination of public institutions to create opportunities and conditions for its citizens and enterprises to develop and increase innovativeness. This process is similar to the "Copernicus Plan" adopted by the Belgian government, but the organizational format and structure of various Polish central government departments have not changed much.

1.2.4 Belgium: stress the role of the labor market

The Belgium Economic Perspectives (for five years)[13] is annually published by the Federal Planbureau (FPB).

Belgium, with per capita GDP of US$46,567 in 2016, ranked the 14th among EU countries, higher than the EU average; the unemployment rate at the end of 2016 was 7.833%, which fell to 7.089% at the end of 2017 and further to 6.1% in the first

[13] Federal Planbureau, Economic Perspective 2018-2023.2018.source: https://www.plan.be/publications/publication-1766-fr-perspectives+economiques+2018+2023+version+de+mars+2018.

quarter of 2018. The labor market has embraced a sound momentum of development. But the Economic Perspectives 2018-2023 published by the Belgian Federal Planbureau (FPB) revealed that Belgium might lack the base for workforce development in the next five years.

In the past decade, some reforms promoted by Belgium imposed negative impacts on the workforce participation rate of the working-age workforce. Such reforms as the higher education reform, re-employment monitoring of the unemployment and subsidy scheme show particularly lasting impacts. According to the document, the detailed information of the impacts will be included in the full text that is to be released in June 2018. At the meantime, the index of the macroeconomic dynamics rose from 72.8% in 2015 to 73.3% in 2017, which FPB expects to further rise to 74.2% in 2023. Considering the declining population contribution rate and the slowing down of workforce supply growth, only 12,400 workforces are estimated to be added in the market in 2021 and about 4,600 in 2022. Upon the backdrop of slowing down or even zero workforce supply, in order to maintain a macroeconomic dynamics index of 74.2%, it is necessary to maintain the workforce participation rate of the working-age population.

In addition, Belgian Prime Minister Charles Michel mentioned the new strategy for 2017-2030 during the first China-Belgium Economic Forum held on October 31st, 2016. The new strategy that was taking shape prioritized digital integration, energy, personnel connectivity and citizenship medical technologies. This means to ensure the workforce' skills and workforce participation rate between 2018 and 2023, meet the new strategy's requirement for improvement of workforce's quality and further achieve the sustainable development of labor market, maintaining the stable growth of macroeconomic dynamics serves as an important component of building the economic and workforce foundation for the new strategy for 2017-2030. At the current phase, Belgium has implemented two strategies at a large scale to improve the workforce quality (skills), including the employment and skills strategy and the green skill development planning. These two strategies will be further elaborated in details later.

1.2.5 Germany: Industry 4.0

Germany, with per capita GDP of US$50,649 US in 2017, ranked sixth among the EU countries. As of July 2018, Germany's number of the registered unemployed fell by 193,000 in July to approximately 2.325 million. This marked the lowest figure in July since the reunification in 1990, with an unemployment rate of 5.1%. The number of registered vacancies was 823,000, an increase of 72,000 over the previous year. Hubertus Heil, the Federal Minister of Workforce and Social Affairs, believes that the "core challenge" facing new employees is a higher level of workforce skills to adapt to the potential of technological transformation and global market competition.

Industry 4.0[14] is one of the ten future programs proposed in the "*High-tech Strategy 2020 for Germany*" (2010) issued by the German government, aiming to improve the smart production in the manufacturing sector, establish the smart factory of adaptability, resource efficiency and genetic engineering and integrate customers and business partners in business and value processes. By combining mass production with individualized customer needs, Industry 4.0 has the advantages of high cost-effectiveness and high-quality development.

This has tapped the great potential of Germany's economic development. As digitalization is widely applied in industries, value creation process will change and the new business models and new perspectives of employees will also emerge. Especially for small and medium-sized enterprises, the smart digital production processes offer tremendous opportunities. It is estimated that by **2020**, Germany will invest 4 billion euros in Industry 4.0, driving output growth of 15.3 billion euros and expanding digitalization to 83% of enterprises. In addition, as to the workforce market, about 15 million jobs are directly or indirectly created by manufacturing, meaning that the value and quality of work in the industrial sector will be greatly improved.

In the process of developing Industry 4.0, the German government has also produced insights into such areas as workplace and work processes, information and

[14] The German government elaborated on the Industry 4.0, covering such aspects as concept description, application, and norms and standards. For more information, please visit: https://www.bmwi.de/Redaktion/DE/Dossier/industrie-40.html.

data security, technical norms and standards and legal framework[15]. Groups of action are established to investigate and analyze relevant information.

When considering the ***workplace and work processes***, the German government believes that the fundamental change of the Industry 4.0 will occur in the way these products and services are manufactured and delivered in the future. Communication in factories will often be seamless and wireless, enabling employees to interact more efficiently with intelligent production equipment. This development will open up opportunities for work to be organized differently, for example with workplaces that are designed to be health-friendly, and more flexible and family-friendly working arrangements.

When considering ***information and data security***, the German government believes that processes in networked production environments that are as reliable and secure as conventional manufacturing today will be the foundation of Industry 4.0 in practice. Therefore, there are already IT security solutions for all aspects of Industry 4.0. However, the IT security techniques and solutions sometimes need to be adapted to the specific requirements of production environments. When production environments and partners vary and the existing security technology cannot satisfy the need for data protection, new security standards and new approaches are needed.

In considering the ***technical norms and standards***, the German government believes that Industry 4.0 factories will feature an unprecedented degree of automation and extensive use of the Internet. Different systems need to be able to communicate and interact. This requires interfaces to be designed according to internationally agreed norms and standards. To this end, the German government developed the RAMI 4.0 to bring together the essential elements of Industry 4.0 in a 3D layered model. This framework can be used to systematically classify and further develop Industry 4.0 technologies.

When considering the ***legal framework***, the German government believes that a

[15]The German government believes that as a complex project covering diverse and often overlapping areas of action, the Industry 4.0 calls on all relevant industrial policy-makers and decision-makers to engage in communication. For more information, please visit: https://www.plattformi40.de/I40/Navigation/DE/Industrie40/Handlungsfelder/handlungsfelder.html.

sound legal basis is a prerequisite for the digitization of the entire value chain. It further points out that legal provisions can only ensure security and encourage innovation if they keep up with the development of new business models. To achieve this, legal analyses should be carried out while new technologies are in the research and development phase, and not only after a product has been launched.

1.3 The New Development Philosophy calls for High-quality Development

"As socialism with Chinese characteristics has entered a new era, the principal contradiction facing Chinese society has evolved to the contradiction between the unbalanced and inadequate development and the people's ever-growing needs for a better life". The 19th National Congress of the CPC correctly defined that "China's economy has been transitioning from a phase of rapid growth to a stage of high-quality development", which was elaborated in the part "Applying a New Vision of Development and Developing a Modernized Economy"[16]. Therefore, in order to resolve the principal contradiction at the phase of high-quality development and address inadequate and imbalanced development, effort must be made to firmly pursue the vision of innovative, coordinated, green and open development that is for everyone, gradually improve the quality and efficiency of development, satisfy people's growing needs in economic, political, cultural, social, and ecological aspects and achieve balanced and adequate developed among different regions, industries and groups.

1.3.1 Innovation drives development

The report at the 19th National Congress pointed out that "innovation is the primary driving force behind development" and the underpinning for building a modernized economy. For innovation to play a leading role at the stage of high-quality development, efforts must be made to "aim for the frontiers of science

[16]Securing a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era, Xinhuanet. 2017. Source: http://www.xinhuanet.com/politics/19cpcnc/index.htm.

and technology, strengthen basic research, make major breakthroughs in pioneering basic research and groundbreaking and original innovations". The innovation system supports the development of the modern economy in which a market-oriented system is established and enterprises are the main players. The system also promotes the synergy among enterprises, universities and research institutions and encourages the application of advances in science and technology. At the meantime, a culture of innovation is actively fostered; talents are cultivated and valued; and the creation, protection and utilization of intellectual property is strengthened.

Innovation is critical in two aspects in driving China's current economic development. The first is the rapid development of the digital economy and sharing economy based on the Internet technology and digital technology. As key areas where Chinese workforce make innovations and start us business, the digital economy and sharing economy represent one of the important channels to foster new growth areas and drivers of growth and an important process for workforce to realize self-fulfillment and improve their quality. The second is the expansion of the development and application of artificial intelligence technology based on industrial robots and computerization (and automation). If combined with digital technology, the human-machine cooperation can create more economic value and encourage workforce to improve their working ability to adapt to economic development.

1.3.2 Coordination promotes development

In terms of the patterns of development, at the macro level, the balanced development between the central and western regions and the eastern region should be achieved; at the intermediate level, efforts should be made to simultaneously push forward the development of the old industrial bases in northeast, the Beijing-Tianjin-Hebei region, the Yangtze Economic Belt and the border areas; at the micro level, efforts must be made to create city clusters which enable the coordinated development of cities of different sizes. Specifically, it is necessary to ensure stable and efficient agricultural production and achieve the technological transformation of manufacturing industry and the high-level development of service industry. Efforts must be made to mitigate the widening income gaps among different social groups

while giving full play to the role of the labor market (and its price mechanism) in workforce input, skill selection and income distribution.

The digital economy can satisfyingly overcome the geographical and transportation factors that constrain economic development and make up for the limitations of physical space with technological advantages. The rapid development of e-commerce services in China in recent years has proved that digital technology can reflect the product information of underdeveloped regions in the national commodity market in a timely and authentic manner. By lower transaction costs and increase transactions, digital economy can help the underdeveloped and fully developed regions achieve a win-win outcome.

1.3.3 Green concept transforms development

"We want both gold and silver mountains (valuable assets) and lucid waters and lush mountains." The concept of green development has been extensively implemented both home and abroad, covering economic policies, production methods, workforce skills, and product types. The measures aiming to synergize green development and the high-quality development at this stage are coordinate the high-quality supply and the demand of environmental protection on the basis of sustainable development. Industrial production capacity will be optimized through supply side reform to allocate stock in a scientific way, cultivate green skills and achieve low carbon efficiency.

Artificial intelligence applications based industrial robots and computerization (automation) will be an important approach to enable this transformation. "Green Development" is one of the five basic policies of "Made in China 2025". The policy requires "organizing and implementing special technological transformations such as energy efficiency improvement, clean production, water conservation and pollution control and recycling", which is compatible with the advantages of cleanness, efficiency and flexibility of industrial robots and computerization (and automation). Achieving green development through artificial intelligence technology and other means of technological applications not only promotes the transformation of production methods and the improvement of workforce' skills as required in the green

development concept at home and abroad, but also helps to lay the technical foundation for achieving high-quality supply and green demand.

1.3.4 Openness consolidates development

The achievements since the reform and opening up are remarkable. In the period of high-quality development, opening-up is the only path to a modernized economy, and is essential to meet the people's growing needs for a better life. Adhering to and further reform and opening up is conducive to promoting China's economic transformation and upgrading enabled by market means and serves as the guarantee for the delivery of high-quality development achievements in the future. At a more macroscopic level, open development links the economic growth of countries sharing common interest and promotes the common economic development in the process of boosting economic interconnectivity. This also marks the manifestation of the concept of common interest in the economic development under the framework of building a community with a shared future for mankind.

In addition, open development should also include the opening of the domestic market, meaning that markets and industries that are currently suffering from weak competitiveness should be opened to qualified and competent market players to stimulating market vitality and creativity. Efforts in this regard should aim to realize effective incentives for property rights, free flow of factors, flexible prices, fair and orderly competition and survival of the fittest under the conditions of the socialist market economy.

1.3.5 Delivering development by sharing

Sharing referred here can be interpreted in two ways. The first is to share economic achievements among countries; the second is to sharing economic growth outcomes by all the members within a society. The former is an inevitable requirement for the building of a community with a shared future for two countries, regions or even mankind. It is necessary to adhere to the views of international power, common interests, sustainable development and global governance. The latter serves as a critical guarantee for meeting people's growing needs for a better life. In this regard, efforts must be made to make sure the simultaneous growth of economic

indicators and household income and the simultaneous increase in workforce productivity and workforce remuneration.

In terms of the concrete ways to deliver the goals, reform of personal income tax and the social security contributions that were introduced lately represent the state's emphasis on adjusting income distribution, achieving social equity and promoting balanced development. On this basis, to extensively share the achievements of economic development among all members of the society, it is important to work on the property rights system and consider expanding the content of property rights in terms of assets, technology, land and human capital. It's equally important to clarify the role and function of property rights in achieving the economic development outcomes. Outcome sharing on the basis of clear property rights can give all members of society a sense of "fulfillment".

2. High-quality Development Invokes Higher Requirements for Workforce Quality

Upon the backdrop of implementing the new vision for development, the high-quality development with innovation as the driver, coordination as the impetus, green development as the opportunity, openness as the guarantee and sharing as the goal needs a high-quality workforce to provide personnel and skills, which in turn serve as a source of driving force for high-quality development. At the meantime, high-quality development, as a historical process, continuously imposes higher requirement on the all-round quality of the workforce. High-quality development and high-quality workforce, while complementing and promoting each other, make up an important part of implementing the new vision for development and building modernized economic system.

2.1 The specific requirements high-quality development invokes for workforce quality

When examining the quality of workforce, a comprehensive approach is taken to focus on their physical and psychological health and assess such indicators as average life expectancy (at birth), nutrition intake and mental health. When examining the education of workforce, main evaluation involves secondary education and higher education. When examining the skill level of workforce, both quantity and quality are taken into consideration. In terms of quantity, we choose the index counting the number of scientific and technical personnel, aiming to reflect the development of certain groups of workforce; in terms of quality, we choose the index measuring the workforce productivity, aiming to reflect the extent that workforce exercise their skills. When examining the training of workforce, we mainly measure the gap between the current vocational training and the requirements of high-quality development through the number of vocational training institutions and enrolment.

2.1.1 High-quality supply proposes higher requirements for workforce skills

The supply-side structural reform upon the background of high-quality development is an important measure to carry out industrial transformation and

upgrading. The upgrading of production technologies and equipment urges workforce to correspondingly upgrade their skill levels and provide a solid personnel and technical foundation for post-transformation industrial development. From this point, the productivity performance of workforce reflects to what extent and how well workforce, equipment and technologies are integrated after the transformation.

In addition, the core for workforce to meet the requirements of the high quality is the capability to achieve high-quality development, which calls for the continuous improvement of workforce skills. A fundamental question facing the high-quality development is how to shift from a development model that relies on workforce dividend to one that relies on the quality of human capital. The key enabler of this transformation is the shaping of the learning ability of workforce.

2.1.2 High-quality demand raises higher requirements for the comprehensive quality of workforce

The basis for promoting high-quality demand is the large-amount emerging middle-income population (around 109 million according to the recent calculation by the National Bureau of Statistics). They boost urbanization and open up a huge market of domestic consumption. But according to a NBS 2017 estimate, by 2025, the (physical) labor market would witness an annual reduction of 10 million working-age population, with a total reduction of about 10% of the current population. While the number of workforce is decreasing, it is important to improve their (physical and mental) health, lower the risk of diseases and increase life expectancy. These efforts are conducive to ensuring the physical and mental health of workforce, improving their consumption expectations and capacity, and meeting the needs of high-quality demand. The physical and mental health of workforce can be examined with such indicators as life expectancy, nutritional conditions and psychological health.

2.1.3 High-quality input and output create higher requirements for the training of workforce

High-quality input and output focus on intensive development, human capital dividends and high workforce productivity. It also aims to improve the intensive use of land, minerals and energy resources to enhance sustainable development. In the process of economic transformation and development, there are two channels for

workforce to gain the skills that can satisfy the new need. The first is vocational education and the second is on-the-job training.

The overall quality of China's workforce is yet to adapt to the requirements for accelerating the transformation of economic growth model, facing salient challenges of generally low education level, relatively low vocational skills, lack of high-quality technical workforce and insufficient human capital investment. According to a workforce survey conducted by the All-China Federation of Trade Unions in 2012, workforce received average education of years 12.95 years; 52.7% of the workforce graduated from secondary technical schools or lower; 76% workforce obtained only primary titles or even no titles; only 34.6% of employees received skills training after leaving the last job. As workforce' quality has become an important factor affecting the transformation of China's economic development mode and the strategic restructuring of economy, it is imperative to strengthen vocational skill training and improve workforce' quality.

2.1.4 High-quality distribution brings about higher requirements for education resources accessible to workforce

To achieve high-quality distribution, market should play a decisive role in resource allocation with higher efficiency. In the context of high-quality development, educational resource allocation should be optimized according to the current education level of workforce, mainly at the stages of secondary education and higher education. An emphasis has been laid on examining the education received by rural migrant workforce.

2.2 At the current stage, the quality of workforce is yet to meet the needs of high-quality development

At present, different regions and groups vary dramatically in workforce' skills, comprehensive quality, education and training. Workforce in impoverished and remote areas face grave challenges in improving their quality. The technical training for rural migrant workforce and newly-transformed industrial workforce has huge potential for further development. The professional skills of college students cannot match the realistic need of jobs in a satisfactory way.

2.2.1 Workforce' skills fail to fulfill the requirement of high-quality supply

In the current workforce, the proportion of newly-added technicians grows at a low speed annually; the overall workforce productivity stays at a low level compared with the major economies (countries); the growth of digital technology poses new challenges to the regular skills of workforce.

I. Low share of technicians cannot meet the demand of transformation

High-quality supply refers to higher-quality supply of goods and services. Though China has the most complete industrial system and supporting network in the world, it is visible in Table 1 that technicians account for a much lower share of the workforce compared with the developed countries. At the meantime, a main reason why many products stay at the middle- or low-end of the value chain and key technical face restrains is that the front-line workforce still cannot meet the requirements of industrial transformation and upgrading at this stage.

Table 1 Contrast of quantity of scientists and technicians in some countries

Country	Year	The total R&D[17] number of new	R&D Per 10,000 employees	Year	The R&D researchers	R&D researchers Per 10,000 employees
China	2016	3878000	50.0	2016	1692000	21.8
Australia	2010	148000	132.0	2010	100000	89.7
Brazil	2010	267000	21.7	2010	139000	11.3
Canada	2013	227000	125.6	2013	159000	88.2
France	2015	429000	155.7	2013	278000	100.9
Germany	2015	641000	148.8	2015	388000	90.1
Italy	2015	248000	101.4	2015	121000	49.3
Japan	2015	875000	132.2	2015	662000	100.1
Korea	2015	442000	170.4	2015	356000	137.4
Netherlands	2015	128000	146.0	2015	77000	87.6
Poland	2015	109000	68.4	2015	83000	51.7

[17] R&D ： Research and experimental development.

Russia	2015	834000	115.3	2015	449000	62.1
Spain	2015	201000	108.7	2015	122000	66.3
Turkey	2015	12.2	45.9	2015	9.5	35.7
Britain	2015	41.7	133.1	2015	28.9	92.5
America	——	——	——	2015	138.0	91.4

Source: OECD, Main Science and Technology Indicators 2017-1.

II. Low overall labor productivity hampers the development of key industries

Labor productivity is usually highly correlated with economic growth. Globally, when the labor productivity grows at a higher speed, the economic growth rate also accelerates; when labor productivity growth slows down, the economy grows at a lower rate. Labor productivity has become a landmark indicator to measure whether a country has further space for economic growth. Since China was late in opening up to the outside world and lagged behind in economic developments, China's unit labor productivity was extremely low in the early 1990s, less than 2% of that of the US and even lower than India. It is precisely because China's economy started from a low base that after it took off rapidly, the unit labor productivity also increased rapidly. From 1995 to 2015, China's unit labor productivity grew at an average annual rate of 8.6%, much higher than the world average of 1.2%. However, rapid growth does not mean that China's labor productivity was very high, which actually still stayed at a very low level[18].

According to statistics released by the Ministry of Human Resources and Social Security in July 2017, among the ordinary blue-collar workforce or ordinary skilled workforce, the ratio of job vacancies and labor supply was 1.26 for workforce engaging in production, logistics equipment operation and professional technicians, showing the imbalance between supply and demand in the manufacturing industry. The problem might be caused by the changes in views of employment and career choice, but more likely by the inability of workforce to meet the demand of high-quality supply. This problem was more obviously revealed in the comparison of

[18]Netease News (2016). *China's labor productivity grows rapidly, but reaches only one third of the world average*，retrieved 3 Aug, 2018 from：http://data.163.com/16/0910/01/C0IJDUK8000181IU.html.

overall labor productivity in the manufacturing sector. According to relevant indicators selected by the 2015 Report on China Manufacturing Power Development Index" [19] and the comparison with those of industrialized countries, China's manufacturing comprehensive index ranked fourth in 2014, with apparent gaps with the top three. These comparisons indicate there is huge space for China's manufacturing industry to realize transformation and upgrading and that workforce, as personnel basis, should further improve their skills.

Ranking	2012		2013		Annual growth	2014		Annual growth
1		156.12		158.5	2.38		161.05	2.55
2		126.1		122.98	-3.12		123.59	2.71
3		119.49		120.88	1.39		122.23	-0.75
4		89.48		94.02	4.54		96.36	2.34
5		69.62		71.58	1.96		72.44	0.86
6		67.14		66.46	-0.68		66.38	-0.08
7		61.52		62.16	0.64		64.18	2.02
8		39.64		39.71	0.07		40.89	1.18
9		33.33		28.7	-4.63		28.57	-0.13

Source: Report on China Manufacturing Power Development Index, Chinese Academy of Engineering, 2016.

Figure 1: Comprehensive index of 9 manufacturing powers from 2012 to 2014

China's overall labor productivity, which represents the capacity of workforce to match their skills with technology and equipment, was merely US$ 2.31 per person, ranking the 7th among 9 countries, only above Brazil (US$ 0.39 per person) and India (US$ 0.69 per person).

[19]Chinese Academy of Engineering, Report on China Manufacturing Power Development Index; Please visit http://www.cae.cn/cae/html/main/col1/2016-07/01/20160701085827791756672_1.html for the full text.

Table 2 Statistics of overall labor productivity of manufacturing of seven countries in 2014

Country	Overall labor productivity of manufacturing industry
China	2.31
United States	11.18
Japan	11.02
Germany	10.21
United Kingdom	7.14
France	7.35
ROK	9.22

Source: Report of Development Index of Manufacturing Powerhouse of China, Chinese Academy of Engineering, 2015.

The high ranking of manufacturing index and the low ranking of overall labor productivity suggest that in the new normal and the new era, technical conditions, despite of their impacts, are no longer the main obstacle to the development of the manufacturing industry. Rather, workforce' skills will become the main influence factor of unit productivity and further affect the growth of the manufacturing industry. As highlighted in the Made in China 2025 that "all labor productivity should be significantly improved", in the future, the upgrading of labors skills is crucial to the development of the manufacturing industry.

III. Digital technology emerges with initial impact and poses challenges to regular skills

In recent years, while creating new jobs, digital economy and artificial intelligence technology has gradually replaced a number of traditional jobs and as a result, certain regular skills have gradually lost out and were unable to be applied. Tepper, SJ (2016) emphasized in his study that as science and technology advance to take place of low-skilled giggers with machines and artificial intelligence, the most

effective solution is to correspondingly intensify their vocational skills training and develop new skills, which is distinctly different from the low regular skills that they have grasped. Mulcathy (2017) also believes that acquiring skills that can adapt to the market needs is the way for giggers to survive.

As artificial intelligence technology keeps growing, regular tasks and skills will slowly disappear. Workforce with certain types of skills that used to qualify them for jobs in transportation, logistics services, office work, production and assembly lines are faced with the risk of being replaced (Frey and Osborne, 2017). Regarding the direction of future skills development, the European Political Strategy Center suggested in its 2018 report titled "*The Age of Artificial Intelligence: Towards a European Strategy for Human-Centric Machines*" that some workforces will lose their jobs to machines. But the future focus must be on facilitating the transition and improvement of their regular skills, so that workforce can develop skills that can be applied to new technologies and equipment and gradually cultivate innovation capacity based on a certain level of technologies and skills. The ultimate goal is that the skills and value of workforce grow simultaneously with the development of artificial intelligence.

2.2.2 The comprehensive quality of workforce is yet to meet the requirements of high-quality demand

The comprehensive quality of laborers shows evident regional differences. In terms of physical health, the workforce in the impoverished and remote regions don't have satisfactory life expectancy and nutritional conditions. In terms of psychological health, workforce in the workplace suffer from more psychological problems than those in other countries and regions.

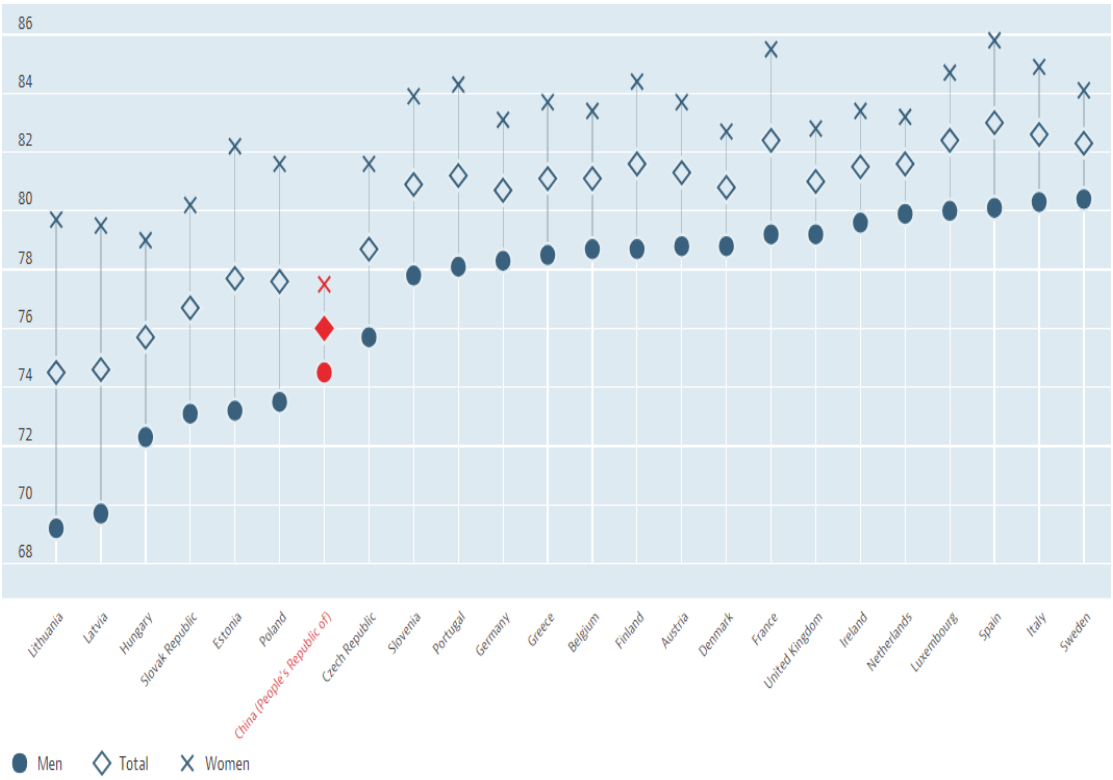
I. The life expectancy is still generally low; and the western region obviously lags behind

Life expectancy at birth is one of the most commonly used indicators to assess population health, which is the number of years the new born population expects to survive. Life expectancy of a population is determined by two factors. One is the social and economic conditions and health care standards. Therefore, life expectancy

varies dramatically in different societies and at different periods. Another one is physical fitness, genes and living conditions, which make life expectancy, vary among individuals. It is thus possible, through scientific methods and with the information of death rate, to calculate the average number of years each person is expected to survive, which is the average life expectancy of the population. In addition, the average life expectancy, as an indicator to measure economic development and quality of medical and health services in a society. Since the founding of the People's Republic of China, due to the emphasis the CPC and the Chinese government have put on people's livelihood, Chinese society, economy and medical services have scored rapid and remarkable development and average life expectancy of the Chinese population has risen immensely[20].

According to OECD standards, the increase in life expectancy at birth can be attributed to many factors, including better living standards, more healthy lifestyles, higher-quality education and more access to quality health services. We can see in Figure 1 that among the 24 surveyed countries, the life expectancy (born at birth) of Chinese women is less than 78 years old and at the lowest level; the data of men ranks the 18th, slightly higher than that of some EU countries but still at a relatively low level; overall life expectancy (at birth) is low, ranking the 21st. The above data indicates that at the current stage, the life expectancy of Chinese remains generally low. Another data for comparison is per capita GDP, the most commonly used indicator for measuring people's living standards. China's per capita GDP in 2017 was US$9,380, ranking at the bottom among the 24 countries. These facts indicate there is still a huge gap between China and European countries in terms of workforce's living conditions and physical health.

[20]China Industry Information Network (2017). *Comparative Analysis of Per Capital Life Expectancy of Chinese Provinces, Chinese Cities and the World*, retrieved 2 Aug, 2018 from: http://www.chyxx.com/industry/201709/564463.html.



Source: OECD, 2018, https://data.oecd.org/healthstat/life-expectancy-at-birth.htm。

Figure 2: Comparison of life expectancy (at birth) among China and some EU countries

We also consider the regional differences in life expectancy. In 2020, China's per capita life expectancy was 74.83 years, but some regions' per capita life expectancy stayed at a level below the average and showed relatively huge gaps, including Qinghai (70.0 years), Tibet (68.2 years), Yunnan (69.5 years), Guizhou (71.1 years) and Gansu (72.2). However, in view of the increase in life expectancy, the growth rate in the western region was the most evident in the 20 years from 1990 to 2010. Life expectancy increased by 9.4 years in Qinghai, 8.5 years in Tibet, 6.1 years in Yunnan, and 6.8 years in Guizhou was old, significantly higher than the average increase in the eastern region of around 5.0 years[21]. This shows that the government's focus on and investment in the western region have helped boost the per capita liver expectancy in local societies. Therefore, further efforts should be made in the future to support and facilitate the development of the western region, especially in areas such as social

[21]Only the official statistics in 2013 recorded the per capital life expectancy regions. Detailed data by regions were absent in future statistics. For more information, please visit: http://www.stats.gov.cn/tjsj/ndsj/2013/indexch.html.

security, medical care, and infrastructure construction.

II. Future nutrition is not expected to reach a satisfactory level in the foreseeable future, not least in the poverty-stricken areas, where the current status is worrying

The workforce development is the most fundamental element, providing the driving force for the economic and social development. Workforce development, i.e. quality of population, is determined by genetics, nutrition and education. Genetics is a factor which cannot be changed within a short period of time, while nutrition and education is subject to changes. Nutrition determines a person's physical and mental growth and development, and his/her maintenance of good health. Education determines a person's knowledge and moral character.

According to the results of *Nutrition and Health Survey of Chinese Residents* released by the National Health and Family Planning Commission of China in 2017, in spite of the improvement in Chinese residents' nutrition and health in the recent decade, problems still exist in urban residents' diet, leading to the deficiency of calcium, iron, and Vitamin A, B1 and B2. As a result, "hidden hunger" occurs, which refers to the organism's symptoms of hunger due to hidden nutritional needs as a result of imbalanced nutrition or deficiency of certain vitamins and essential minerals, coupled with excessive intake of other nutritional ingredients. Institute of Nutrition and Food Security, Chinese Center for Disease Control and Prevention pointed out that without strong intervention to help children and teenagers develop and keep good lifestyles, China would repeat America's mistake, which means China's incidences of diabetes, obesity and cardiovascular diseases in 20-30 years will reach 30%, current level of the US. Neither "hidden hunger" nor overnutrition does any good to the sound development of physical fitness of future workforce.

The problems in poverty-stricken areas are more visible. Take the nutrition intake of infants and young children in these areas as an example, we'd find that according to *Nutrition and Family Upbringing of Children Aged 0-6 in China's Poverty-stricken Areas*[22] in 2016, the prevalence of underweight and growth

[22] The report jointly released by the Department of Children's Work of All China Women's Federation and the National Health and Family Planning Commission of China points out that among the 35.97 million people of

retardation among rural children in poverty-stricken areas is 6 to 8 times that of their urban counterparts, in spite of the marked decrease since 2000. More than 50% of the children in poverty-stricken areas suffer from early zinc deficiency, while the proportion of children there suffering from Vitamin A deficiency is 6 times that of their urban counterparts. Meanwhile, only 24.8% of infants from 0 to 6 months old in these areas are exclusively breastfed, lower than the global average of 38% and the national level of 27.6%, and the number is further on the decrease.

III. Psychological health status instills little optimism with conspicuous problems in workplaces

Psychological health refers to a kind of sound condition featuring rational cognition, emotional stability, appropriate behavior, interpersonal harmony, and adaptation to changes in a person's growth and development. It is an integral part of overall health. To improve psychological health service and perfect social psychological service system is the key measure to enhance the psychological health of the general public, improve the stability of social mood and harmonious atmosphere, and promote public happiness. It is also the basic requirement for fostering good moral standards, promoting the coordinated development of the economy and the society, and fostering and practicing socialist core values, providing guarantee for the lasting stability of the country. [23]

As China is currently in the rapid economic and social transition, people are facing faster pace of life and increasingly intense competition. Against this backdrop, individual psychological problems and social ills they caused have become increasingly obvious. According to the result of the *White Paper on the Psychological Health of Urban Residents of China* released in April 2018, a survey based on the big data analysis in 26 provinces (covering about 1.13 million urban residents) through PEW psychological health management system, 73.6% are in the status of psychological sub-health, 16.1% have some degree of psychological problems, and

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extreme poverty in the country, around 3.3 million to 4 million are children aged from 0 to 6.

[23] Bureau for Disease Prevention and Control (2016). *Instruction on Enhancing Psychological Health Service*, retrieved 2 Aug, 2018 from：
http://www.nhfpc.gov.cn/jkj/s5888/201701/6a5193c6a8c544e59735389f31c971d5.shtml.

only 10.3% are psychologically healthy. Meanwhile, according to the 2015 statistics from Chinese Association for Mental Health, in this country, workplace depression rate was as high as 2.2%-4.8%, with 70% of respondents having the experience of having to suspend work due to depression. According to the 2017 statistics from the WHO[24], in terms of depression and anxiety disorders, the two workplace mental problems that catch the most attention of the WHO, China's depression rate was 4.2%, i.e. 54.82 million patients, second only to that of India; while the rate of anxiety disorders were 3.1%, i.e. 40.95 million patients, ranking first in the world.

As a critical state, psychological sub-health would reduce workforce' dynamism, ability to adapt, and responsiveness, affecting efficiency and quality while causing mental and physical illness. Given the requirements of "maximizing the efforts to meet people's need for psychological health service" stipulated in *Instruction on Enhancing Psychological Health Service*[25] and the frequent outbreaks of social incidents caused by psychological problems recently, it is self-evident that the current psychological health promotion and education in China is still inadequate, the psychological health service needs to be further improved for professionals, senior citizens and people with disabilities, and establishing and improving psychological health service system covering different departments, industries and the grass-roots level remain a pressing demand.

2.2.3 The training for workforce is unable to meet the demand for high-quality output

The overall quality of China's workforce cannot meet the demand as China is stepping up the transformation of economic development mode, since there are many problems including low level of education, lack of vocational skills, lack of skilled workforce, and inadequate investment in human capital. The survey on the workforce conducted by All-China Federation of Trade Unions in 2012 shows that the average years of schooling is 12.95 years. The survey also shows that 52.7% receive no further education beyond secondary technical school, and 76% only have junior

[24] WHO. Depression and other common mental disorders: global health estimates，retrieved Sep , 2017. from：http://www.who.int/mental_health/management/depression/prevalence_global_health_estimates/en/.
[25]Instruction on Enhancing Psychological Health Service, by National Health and Family Planning Commission, etc. See: http://www.nhfpc.gov.cn/jkj/s5889/201701/db8368db61894d84b4148a44aa3602f5.shtml.

professional title or no title. In addition, only 34.6% have received skills training after the ending of their previous jobs. Workforce quality has become an important factor in the transformation of China's economic development mode and the strategic economic restructuring. It is imperative to enhance vocational training and improve workforce quality. [26]

I. Slow development in vocational education and institutes

According to *Statistics Bulletin of the Development of China's Education in 2016*[27], the total number of vocational training institutes across the country in 2016 was 93,400, 309 less than the year before; the number of secondary technical schools was 3,398, 58 less than the year before; the total number of faculty members of secondary vocational schools was 1,086,100, 15,700 less than the year before. The number of vocational high schools, vocational schools, and secondary technical schools for adults was 3,726, 2,526 and 1,243 respectively, 181, 19, and 51 less than the year before. It is necessary to further development the facilities and teaching staff for the workforce training so as to improve the quantity and quality of training, given the demand for the transformation of manufacturing placed by the supply-side reform in recent years, additional needs for skilled workforce as a result of new economic applications such as digital technology, and the goal of "by 2020, the enrolment of institutes for secondary vocational education and institutes for vocational education at the college level should reach 23.5 million and 14.8 million respectively, with 350 million people receiving on-the-job training" set forth in the *Plan for the Development of Modern Vocational Education System (2014-2020).*

II. Sharp decrease in the enrolment of vocational education and training

Institutes of secondary vocational education recruited 5,933,400 students, 79,100 less than the year before. 5,336,200 students graduated from these institutes, 342,600 less than the year before. There is huge potential for improvement for the number of China's institutes of vocational training, secondary vocational education coverage,

[26] Chinanews.com (2013). *With Less-educated Workforce, China is Short of Skilled Workforce*, retrieved 3 Aug, 2018 from: http://www.chinanews.com/gn/2013/03-07/4624861.shtml.
[27]Ministry of Education, *Statistics Bulletin of the Development of China's Education in 2016*, retrieved 10July, 2018 from: http://www.moe.gov.cn/jyb_sjzl/sjzl_fztjgb/201707/t20170710_309042.html.

and number of faculty members, given the targets of "ensure equal access to affordable quality vocational and technical education and higher education, including college education, by all men and women" and "dramatically increase the number of youngsters and adults equipped with necessary skills (including vocational skills) for employment, decent jobs and entrepreneurship" by 2030 specified in the *2030 Sustainable Development Goals for Education*, and the goal for training development "by 2020, the enrolment of institutes for secondary vocational education and institutes for vocational education at the college level should reach 23.5 million and 14.8 million respectively, with 350 million people receiving on-the-job training" set forth in the *Plan for the Development of Modern Vocational Education System (2014-2020)*.

In addition, according to the 2016 statistics from the National Bureau of Statistics, 32.9% of all the migrant workforce in 2016 had received agricultural and non-agricultural skills training, down by 0.2% compared with 2015. The skills training for migrant workforce should be further strengthened so as to design programs tailored to their capabilities and industry features, given their current low level of education.

III. Mismatch between training programs and planning of regional development

In the interpretation by the Department of Vocational Capacity Building of Ministry of Human Resources and Social Security of the PRC in 2017 on *State Council's Opinions over the further Improvement of Employment and Entrepreneurship under the New Situation*, the mismatch between vocational training and the economic restructuring and upgradation was identified as a major problem in the labor market with the advent of the 13th Five-Year Plan period (2016-2020). Given the actual conditions of reducing overcapacity in certain areas as a part of the supply-side structural reform, it is found that vocational training arrangements in some areas don't match the 13th Five-Year Plan and thus have no significant role in facilitating the realization of regional development planning.

2.2.4 Workforce educational level fails to meet the high-quality requirements

Faced with the rapid high-tech development, it is imperative to enhance the ability to train high-level innovative talents. The further opening-up after China's accession to the WTO has exposed our relatively weak education sector to more intense international competition. The wide application of information technology has posed a new challenge to the traditional approaches to education.[28] In addition, the reason for the mismatch between the academic courses taken by college students and the actual needs of the job market is that the existing curriculum and education patterns of higher education fail to meet the demand of the current social and economic development. To make up for this loss, it is important to provide on-the-job training for college graduates. But more importantly, the curriculum and education patterns of higher education must be optimized in the first place.

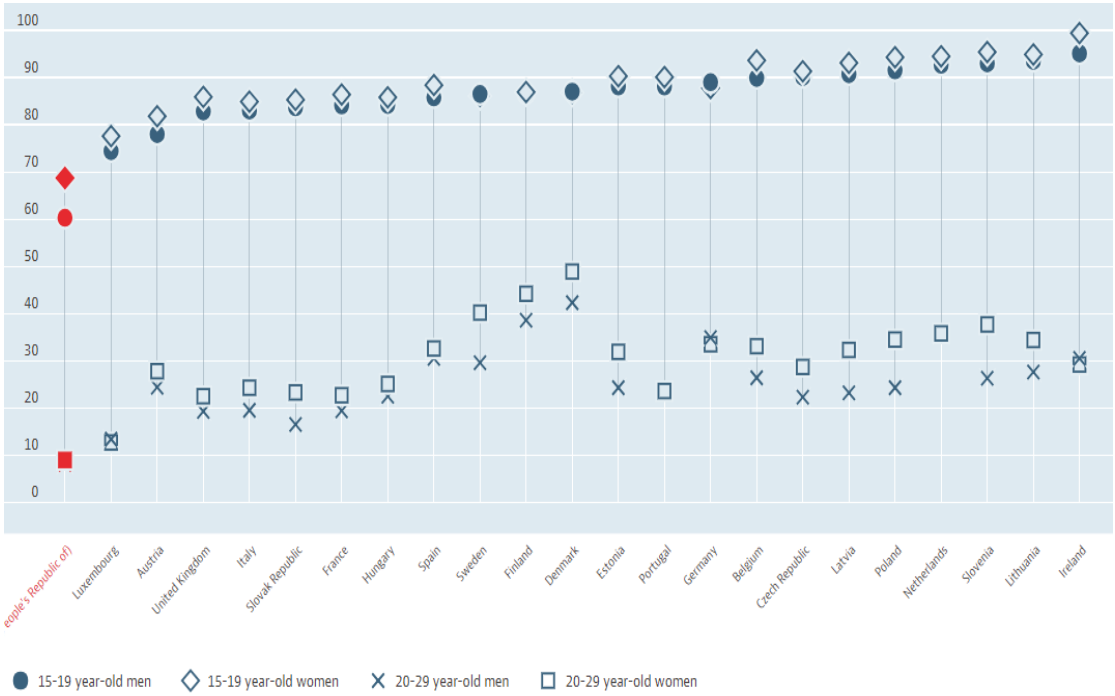

Figure 3 Comparison of Enrolment Rates of Different Groups in China and EU Countries (2015)[29]

The level of education often represents the ability of workforce to adapt to the

[28] Ministry of Education (2001). *Notice by the Ministry of Education on Printing out Minister Chen Zhili's Address at the 2002 Education Work Conference and Ministry's Primary Focus of Work in 2002*, retrieved 3 Aug, 2018 from: http://www.moe.gov.cn/jyb_xxgk/gk_gbgg/moe_0/moe_8/moe_21/tnull_157.html.

[29] Education GPS,OECD (2017), retrieved 22 May, 2018 from: http://gpseducation.oecd.org/CountryProfile?plotter=h5&primaryCountry=BEL&treshold=10&topic=EO.

transformation of economic growth and the development potential. The enrolment rate, expressed as the net enrolment rate, which is calculated by dividing the number of students in a specific age group participating in the education of different levels by the number of people in that age group, represents the educational resources' coverage of certain age groups.

I. Obvious gender difference is found in secondary education, with the enrolment rate staying at low level generally

In terms of the enrolment rate, China didn't fare well in either the gender difference or the overall level. As of 2015, there had been a 10% gap in the enrollment rate among males and females aged 15-19, with the male enrollment rate in this age group standing only at 60%. The gender gap in the enrollment rate of secondary education in EU countries for the same period was kept within 5%, and the enrolment rate of EU males in the same age group was over 72%. A huge gap in female enrolment rate in the same age group is also identified between China and EU, as China is 10% lower than the EU average in this regard. It demonstrates that China's overall enrolment rate after the completion of compulsory education is equivalent to the lowest level among the EU countries subject to this comparison.

Education fairness should be achieved. But there is no equation between educational fairness and egalitarianism. Only by adopting different policies to provide disadvantaged groups with preferential treatment can we truly promote educational fairness.

II. Higher education coverage is relatively small, with limited options of college entrance

In 2015, China's university and college acceptance rate reached 78.32%, but that of universities under the administration of central-government-level ministries was only 5.15%. The acceptance rate was also growing at a slower pace during this period. From 2005 to 2016, the gross enrolment rate of higher education in China increased by an average of 1.79% per annum, from 21% in 2005 to 42.5% in 2016. However, the acceptance rate of "high-quality" and "exceptional" universities under the administration of central-government-level ministries grew only by 0.7% per year

during this period, failing to keep apace. In addition, the number of students admitted to key colleges and universities per 100,000 candidates is too small. In 2015, 74,310 per 100,000 students were admitted to colleges and universities, but only 5,146 of them were accepted by universities under the administration of central-government-level ministries.[30]

Compared with EU countries, China's enrolment rate among people aged 20-29 was still at a low level. The enrollment rate among males in the two ages groups was respectively 60.3% and 8.1%, while females 68.7% and 9.0%. Although there is a discrepancy with the high school enrolment rate given by the Ministry of Education, this data can still be used for comparison with EU countries, taking into account differences in statistical caliber. The lowest rate of EU countries during the same period was 77.6% and 12.7% respectively, while the highest level was 99.4% and 29.2% respectively. China's higher education coverage is smaller than EU countries.

III. Migrant workforce are under-educated, and the speed of their education improvement is relatively slow.

According to the *Survey Report on Migrant Workforce in 2016* published by the National Bureau of Statistics in 2017, as of the end of 2016, among all the migrant workforce, 1% had not received any education, 13.2% had received primary school education, 59.4% junior high school education, 17% senior high school education, and 9.4% college education or beyond. In 2016, most migrant workforce only received junior high school education or below, and the proportion of migrant workforce with high school education and beyond increased by only 1.2% compared with 2015. Among them, 29.1% of migrant workforce who leave their hometown for employment received senior high school education or beyond, up by 1.2% compared with that of 2015; and 23.9% of all the locally-employed migrant workforce received senior high school education or beyond, an increase of 1.3% over 2015.

[30] Zhang Jiping, Dong Zefang (2017). *Fairness in High-quality Higher Education: Concept Interpretation, Status Analysis and Policy Recommendation*. *University Education Science*, 1, 42-48.

Table 3 Education Levels of Migrant Workforce

	General		Migrant Workforce Who Leave Their Hometown for Employment		Locally-employed Migrant Workforce	
	2015	2016	2015	2016	2015	2016
Uneducated	1.1%	1.0%	0.8%	0.7%	1.4%	1.3%
Primary School	14.0%	13.2%	10.9%	10.0%	17.1%	16.2%
Junior High School	59.7%	59.4%	60.5%	60.2%	58.9%	58.6%
Senior High School	16.9%	17.0%	17.2%	17.2%	16.6%	16.8%
College or Higher	8.3%	9.4%	10.7%	11.9%	6.0%	7.1%

Source: *Survey Report on Migrant Workforce in 2016*, National Bureau of Statistics, 2017-4-28, http://www.stats.gov.cn/tjsj/zxfb/201704/t20170428_1489334.html.

The total number of migrant workforce reached 281.71 million in 2016, accounting for 36.3% of the total employment, most concentrated in the manufacturing sector (52.9%). Due to their large number and low level of education, not only the overall workforce development is impaired, the personnel required for the manufacturing transformation and upgrading is also affected. What's more, the basic guidelines of "Made in China 2025" on innovation-driven, quality first, green development, structural optimization, and talent-oriented are compromised as a result, to the disadvantage of the further promotion of supply-side structural reform.

2.3 Main factors affecting the quality improvement of workforce

The factors affecting the quality improvement of workforce are more complicated, both historically and practically; they have both the impacts of development concepts and the conditions of objective development. From the

historical perspective, the pursuit of long-term, rapid, and high-level growth of the national economy in the previous period had concealed the expression of the need from quality of economic development on the quality of the workforce. It is directly reflected pursuit of the quantity and scale of employment in the labor legislation process, and the neglect of the quality of employment and the quality of laborers in the labor market; from the practical perspective, the current downward pressure on economic development still exists, and the national economic regulation has paid more attention to the fiscal and monetary policies of "easy implementation and quick effect" in the short and medium term, and the quality of the workforce enhancing the required systemic, complex, and long-term policy support is difficult to meet the need to boost the economy in the short term. In addition, capital's emphasis on real estate and financial industry for the sake of profit-seeking nature has occupied the living space of the real economy. The lack of the job for the workforce directly leads to the loss of the practical foundation for improving the quality level, and "learning by doing" cannot be realized; The lack of funds and supporting measures for workforce education and skills training also affects the quality of workforce.

2.3.1 Absence of special legislation

Judging from the existing legislative content, the lack of a complete special legal basis for the workforce with employment difficulties as the basis and motivation for providing employment promotion and quality improvement assistance is mostly the side guarantee of other employment legislation, and the content is incomplete.

Specifically, in the Employment Promotion Law, the employment rights guarantee for migrant workforce is only included in Article 31 of all Article 69 , indicating "The rural workforce have equal access to urban employment and equal labor rights with the urban workforce. There is no discriminatory restriction on employment in cities, no detailed responsibility and safeguard measures are given, and the contents of the quality and skills of migrant workforce are not involved. In addition, in the context of supply-side structural reforms, there is currently a lack of employment support and assistance for migrant workforce to adapt to industrial transformation and upgrading, compared with the workforce affected by overcapacity

reduction. This does not reflect the Article 31: the policy practice of the rural workforce enjoys equal labor rights with the urban ones.

The "Professional Education Law" guarantees only those who are in the employment difficulties. Article 7 states "The state adopts measures to develop rural vocational education and support the development of vocational education in minority areas, the and remote and poverty-stricken areas. The state adopts measures to help women receive vocational education and organize the principled provisions for the unemployed people to receive various forms of vocational education, and to support the development of vocational education for the disabled, with no specific content to support the implementation of the means and funding sources. In addition, there is currently no legal basis for supporting the reform and development of the rural education system and education model. Rural vocational education closely linked to agricultural production is not reflected in the existing Vocational Education Law.

Article 3 of the Labor Law clarifies that the workforce has equal access to various labor rights, but it does not specifically address the specific protection of groups with employment difficulties. The Labor Contract Law only guarantees the rights and obligations of both parties to the contract, and in practice it is based on basic rights and obligations to regulate, difficult to meet the needs of improvement of the workforce quality.

2.3.2 Absence of sufficient fund protection

The problem of funds is mainly reflected in the fact that the pressure of local finance, under the background of matching financial power and practical power, is difficult to provide sufficient financial support for large-scale and systematic labor quality improvement work, and the insufficient participation of social forces cannot form an effective supplement.

In 2017, the local government's fiscal deficit accounted for 89.7% of the local fiscal revenue (Ministry of Finance, 2018), 5.7% increase compared with 2016. In the context of economic transformation, the limited financial resources of local governments are concentrated on the supply side, the promotion of structural reforms, and other key economic developments. From Table 4, it can be found that when

considering the investment in per capita education, the investment in education and training in some areas is not ideal, and the differences between regions are huge.

Table 4 Comparison of provincial education inputs in some provinces (regions) in 2016

Province (Region)	Provincial Investment (Unit: 100 million)	Population (Unit: 10,000)	Per capita (Unit: Yuan)
Beijing	258.7	2115	1223
Tianjin	180	1562	1152
Shanghai	242.8	2415	1005
Jilin	157.5	2699	583
Xinjiang	121.5	2233	544
Shanxi	176.3	3793	464
Fujian	136.68	3774	362
Inner Mongolia	88.7	2479	355
Jiangsu	257.69	7939	324
Sichuan	247	8107	304
Hubei	144.4	5799	249
Shanxi	89.48	3630	246
Liaoning	101.9	4390	232
Shandong	190.09	9579	198
Zhejiang	108.74	5498	197
Guangdong	196.69	10644	184
Hunan	111.7	6691	166
Henan	130.9	9413	139
Hebei	84.7	7287	116

Source: Central and provincial budgets for 2016

2.3.3 Absence of supporting measures

In recent years, the structural reform of the supply side has promoted the key industries, especially the transformation and upgrading of the manufacturing industry. The demand for new technologies and new equipment is becoming more and more urgent, meanwhile the recent emphasis on the development of the real economy is becoming more and more obvious. However, from the perspective of the existing policy content, the skills and comprehensive quality of the workforce engaged in manufacturing and physical industries are not paid enough attention, and the corresponding development policies are lacking.

Especially in the provinces (regions) where the task of structural reform of the supply side is heavy, the existing workforce training is mostly centered on the 2016 "Opinions on Doing a Good Job in Staff Resettlement in the Process of Reducing the Excessive Capacity of the Iron and Steel Industry to Realize the Removal of Difficulties", and there was a lack of targeted supporting measures in various regions. At the same time, in the face of the impact of digital technology, automation, computerization and other technologies, the existing workforce training system lacks the training content of the society and market entities to provide diversification and flexibility. The training work led by the government is comparatively distant from the stable policy requirements and market demand, difficult to adapt to the technical progress and the improvement of workforce skills.

In addition, although the emphasis on digital technology and artificial intelligence on workforce skills upgrading requirements has been reflected in the specific content of current higher education, higher education as a long-term, and systematic policy measure requires a relatively long time. It is also necessary to create more conditions for the improvement of the skill level of workforce in short-term training and vocational education.

3. The EU Experience Sets an Excellent Model for Improving the Workforce Quality

This part analyzes relevant policies and measures adopted by EU and some of its member states to improve the quality of workforce amid high quality growth or similar economic policy arrangements. The research group summarizes relevant practices of different countries and regions, and focuses on the experience of certain countries and regions in applying these policies to the market as a complement to get to understand the policies and measures of different countries and regions.

3.1 EU: Life-long learning, vocational training, innovative development, and active employment

EU adopts the following four measures to improve workforce quality: First, life-long learning strategy; Second, EU encourages and supports the education and training of young people; Third, enhancing vocational training, and improves and develops infrastructure related to vocational training; Fourth, actively adopting innovative strategy. In addition, some EU countries have abundant and fruitful experience in implementing the positive employment policy.

Table 5 EU's strategies and measures to improve workforce quality

Lifelong Learning Strategy	**Education and Training of Young People (EU Youth Strategy)**	**Enhancing Vocational Training**	**Adopting Innovative Strategy**	**Active Employment Policy**
➢ *Memorandum on Lifelong Learning* ➢ *Making a European Area of Lifelong Learning a Reality* ➢ *Resolution on*	➢ *EU Youth Report* ➢ Evaluation of the EU Youth Strategy *and the* Council Recommendation *on the* mobility of	➢ *Charter of Fundamental Rights of the European Union Combined with the Treaty* ➢ Establish	➢ EU knowledge flow policy ➢ EU research policy	➢ Support the creation of jobs ➢ Restore the dynamism of labor market ➢ Improve

Lifelong Learning ➢ *Scenarios and Strategies for Vocational Education and Lifelong Learning in Europe* ➢ *Efficiency and Equity in EU Education and Training System* ➢ The Centre for Research on Education and Lifelong Learning (EU 2020 Agenda supports the skills and lifelong learning of adults, learning mobility, language, active citizenship, teaching and learning practice, education investment, labour market outcome and employability)	young *volunteers across the EU* ➢ *The EU Youth Strategy*	European Centre for the Development of Vocational Training ➢ Establish the European Training Foundation		the governance of EU

I. EU advocates and supports the strategy of lifelong learning. "Lifelong learning" is considered EU's key strategy to improve the workforce quality. As a guiding document, *Lisbon Strategy* in 2000 provides guidance for EU's regulation and promotion of lifelong learning. Based on *Lisbon Strategy*, EU has established a comprehensive policy framework concerning lifelong learning, including *Memorandum on Lifelong Learning*, the action plan *Making a European Area of*

Lifelong Learning a Reality, *Resolution on Lifelong Learning*, *Scenarios and Strategies for Vocational Education and Lifelong Learning in Europe-summary of findings and conclusions of the joint/Cedefop/ETF project (1998-2002)*, and *work report of Efficiency and Equity in EU Education and Training Systems*. In addition, EU has set up The Centre for Research on Education and Lifelong Learning based on indexes and benchmarks.

II. Based on the youth strategy of Europe, EU released *the 2012 EU Youth Report*. The report summarizes the outcome in the first working cycle of the EU Youth Strategy (2010-12), proposes the priorities in the coming 3 years, and provides the statistics on how the financial crisis affected the situation of young people in the EU.

The *EU Youth Report* has the following three objectives: to assess the overall progress of the goals set in EU's youth strategy, and the progress of priorities identified for the latest work cycle; and to identify best practices as the basis for prioritizing the next work cycle. The report contains the following: displaying the main results of the EU Youth Strategy in the recent three-year cycle, and submitting the committee's communication record for the priorities of the next cycle; working papers outlining the situation of young people in the EU; summarizing actions taken at the national and EU level to implement the working paper of the EU Youth Strategy; and a response to a questionnaire covering all eight strategic areas based on EU countries.

III. EU enhances workforce vocational training, and promotes the improvement and development of infrastructure relevant to vocational training. In addition to enhancing life-long education and youth education, EU is also committed to strengthening the workforce vocational training, and promoting the improvement and development of infrastructure relevant to vocational training. To put it more specifically, *Charter* of Fundamental Rights of the European Union Combined with the Treaty stipulates the EU's support for vocational training. What's more, EU has also established European Centre for the Development of Vocational Training as well as the European Training Foundation.

Article 166 of ***Charter* of Fundamental Rights of the European Union Combined with the Treaty** defines EU's support for vocational training: The Union shall implement the vocational training policy, support and supplement member states' practice and actions in this regard, and also fully respects member states' programs and organizational responsibilities over vocational training. The goal of EU is to promote adaptation to industrial changes, especially through vocational training and retraining, to improve initial and ongoing vocational training so as to promote career integration and the return to the labor market; to facilitate access to vocational training and to encourage the mobility of teachers and students, especially young people; to promote the training cooperation between educational or training institutions and companies; and to develop the information exchanges and experience in the training systems of member states. In addition, the article also provides that the Union and member states should promote cooperation in vocational training with third countries and competent international organizations.

European Centre for the Development of Vocational Training (Cedefop)[31] was established in 1975 to help develop and implement the EU's vocational training policies. The centre provides data on EU-based vocational education and training policies, monitors labor market trends, and helps the European Commission, EU countries, employers' organizations and trade unions in providing training that match the labor market needs. To put it more specifically, Cedefop brings together policy makers, employers' organizations, trade unions, training institutions, teachers, trainers, and students of all ages (everyone of them has stocks in vocational education and training). Cedefop has set up a forum between the education system and work practices to enable those institutions with stocks to exchange ideas and discuss how to best improve vocational education and training in Europe. Cedefop shares its expertise with political organizations and industry in the EU Countries to help them create learning and work opportunities. As a tripartite organization, the governing board of Cedefop consists of the national governments, employers' organizations and

[31]EU(2018).*Cedefop*, Retrieved 3, April, 2018 from EU website: https://europa.eu/european-union/about-eu/agencies/cedefop_en.

trade unions, the director and staff of the overall management body governed by the European Commission. Cedefop conducts daily work in the labor market and vocational education and training with the support of administrative and communications staff.

European Training Foundation[32] was established in 1994 in order to help neighboring countries fully unleash the capabilities and skills of their people by reforming the vocational education and training (VET) and the labor market system. The ETF supports talent development in 29 partner countries (countries in Southeast Europe, Turkey, Eastern Europe, Southern and Eastern Mediterranean and Central Asia) to help formulate, implement and assess national training policies and programs. ETF's cooperation with partner countries includes seven key areas: support for EU assistance, policy analysis and system progress monitoring, governance of vocational education and training, provision of vocational education and training & quality and qualification systems, employment, skills and employability, entrepreneurial learning and business skills. The institutions and individuals working closely with the ETF mainly include: European institutions, Cedefop, the European Foundation for the Improvement of Living & Working Conditions: Eurofound, and multilateral and bilateral donors active in the ETF partner countries.

IV. EU implements innovation strategy. The EU's innovation strategy is based on the *New Lisbon Partnership for Growth and Jobs*[33] that was relaunched by the European Union in 2005. This process recognizes that one of the main areas for further action is knowledge and innovation to facilitate development. In addition, EU has also formulated the guidelines for national reform plans of member states in the next three years[34] and the *Community Lisbon Programme* for development and

[32]EU(2018).*Cedefop,* Retrieved 3, April, 2018 from EU website: https://europa.eu/european-union/about-eu/agencies/etf_en.

[33] Vught,F.V(2009).The EU innovation agenda: Challenges for European higher education and research, retrieved 4th April, 2018 from OECD website:https://read.oecd-ilibrary.org/education/the-eu-innovation-agenda-challenges-for-european-higher-education-and-research_hemp-21-5ksj19w5lb6h#page1

34 EU(2005).Verdict time for national economic reform programmes,retrieved 4th April, 2018 from euractiv website:https://www.euractiv.com/section/innovation-industry/news/verdict-time-for-national-economic-reform-programmes/.

employment relations[35]. And this plan is the basis of the EU innovation agenda (known as the *Lisbon Agenda*)[36]. In the implementation of the innovation strategy, the EU is committed to promoting the flow of knowledge and encouraging research and development:

EU knowledge flow policy [37] was introduced in 2006. The European Commission has published a strategy called "Knowledge Applied to Practice", which outlines the most important planned and ongoing issues, finds new areas of action for the future and introduces a more professional strategy that can help promote the innovative products and service. The European Commission believes that currently the main obstacles to knowledge flow include cultural differences in different fields, legal barriers, fragmented markets and lack of incentives. Some member states have indeed established relevant mechanism that can promote the flow of knowledge domestically, but neglected knowledge flow among different countries in the world. Therefore, the European Commission has proposed a series of policy recommendations, including: to train a group of high-skilled talents in the university; to implement relevant occupational certification and vocational skills training programs on campus; to provide opportunities for the workforce to work in different research institutions and industries; and to adopt measures that can facilitate the intellectual property management.

EU research policy[38]. The EU had long been committed to the formulation and development of research policies, but the systematic EU research policy had not been gradually improved until the 1980s. A key step in the establishment of this policy was

35EU(2005).Community Lisbon programme focuses on eight key measures,retrieved 4th April, 2018 from euractiv website:https://www.euractiv.com/section/innovation-industry/news/community-lisbon-programme-focuses-on-eight-key-measures/.

36 Vught,F.V(2009).The EU innovation agenda: Challenges for European higher education and research, retrieved 4th April, 2018 from OECD website:https://read.oecd-ilibrary.org/education/the-eu-innovation-agenda-challenges-for-european-higher-education-and-research_hemp-21-5ksj19w5lb6h#page1.

37 Vught,F.V(2009).The EU innovation agenda: Challenges for European higher education and research, retrieved 4th April, 2018 from OECD website:https://read.oecd-ilibrary.org/education/the-eu-innovation-agenda-challenges-for-european-higher-education-and-research_hemp-21-5ksj19w5lb6h#page1.

38 Vught,F.V(2009).The EU innovation agenda: Challenges for European higher education and research, retrieved 4th April, 2018 from OECD website:https://read.oecd-ilibrary.org/education/the-eu-innovation-agenda-challenges-for-european-higher-education-and-research_hemp-21-5ksj19w5lb6h#page1.

the "Multiannual research and technological development framework programmes" (FPs). As the central mechanism for EU's research and technology policy, FPs have become a strategic document to describe the general direction of the EU. Recent FPs reflect the EU's vision to shift from a single focus on improving the effectiveness of fragmented research to the need for more input of public and private capital and for greater cooperation among different countries in research.

In terms of the results and future development in research and innovation, the EU published the *Science, Research and Innovation Performance of the EU (SRIP) Report* in 2018, which analyzes Europe's state of innovation and provides recommendations for future innovative development in EU countries. This report analyzes Europe's performance in science, research and innovation, as well as the driving factors behind this performance on a global scale. It combines comprehensive indicator-based macroeconomic analysis with in-depth analysis[39] of key policy issues. The main conclusions of the report include: economic prosperity and the EU's social model rely on innovation; the EU is a global leader in scientific excellence, and this leadership needs to be translated into more influential innovation and entrepreneurship; Europe must ensure that the entire community contributes to and benefits from innovation; dynamic changes in innovation mean that Europe must update its policies in a mission-oriented manner to better support disruptive innovations that create new markets.

In addition, the EU is still implementing an active employment policy. It mainly involves supporting job creation, restoring the vitality of the labor market, and improving the governance of the EU.

In supporting job creation, the EU believes that the job creation policies can be better implemented through encouraging workforce demand, providing recruitment subsidies, offering tax breaks on the basis of ensuring fiscal sustainability, supporting self-employment and entrepreneurship, regulating forms of employment, increasing real wages, and promoting the modernization of wage system. It also believes that the

[39] EC 2018).*Science, Research and Innovation Performance of the EU (SRIP) report* website, retrieved 4th April, 2018 from European Commission website:https://ec.europa.eu/info/support-policy-making-eu-and-horizon-2020-associated-countries/srip-report_en.

green economy, health care and information and communication technology are the key areas of job creation in the future. Meanwhile, when it comes to the economic foundation of the policy, the EU regards the European Social Fund as the main source of funding for mobilizing EU countries to conduct job creation work.

In terms of restoring the vitality of the labor market, the EU believes that it is necessary to conduct a more comprehensive regulation of the existing labor market, especially by encouraging enterprises to maintain the flexibility of their internal work, raising wages, reducing unstable employment, effectively carrying out economic restructuring, encouraging lifelong learning, providing more employment opportunities for young people, enhancing social dialogues, and expanding social public service. At the same time, the EU has taken more targeted measures to tackle the problem of mismatch between workforce skills and market demand. In terms of forming a European labor market, the EU emphasizes the necessity to eliminate legal and practical barriers that restrict the free movement of workforce and strengthen cross-border matching of workforce.

In terms of improving EU governance, the EU is currently focusing on strengthening the coordination and multilateral supervision of employment policies of different countries by forming a benchmark system with relevant employment indicators and preparing a draft joint employment report, and tracking the progress of relevant policy reforms in different EU countries. In this process, the EU effectively introduces social partners by bringing in third-party roles, and strengthens the link between employment policies and related financial instruments[40].

3.2 Denmark: Education for all, Lifelong Learning, and Digital Technology

Denmark was one of the first countries to embrace globalization.

Denmark has adopted the following four strategies:

[40] See descriptions of the future blueprint of the EMU (Economic and Monetary Union). http://ec.europa.eu/archives/commission_2010-2014/president/news/archives/2012/11/pdf/blueprint_en.pdf.

I. Education for all. These measures include Denmark's efforts in compulsory education and higher education, strengthening vocational education and training, focusing on innovative teaching, adopting high academic standards, offering free Danish courses, taking high standards, etc.

II. It implements a lifelong learning strategy. Denmark released *The 2003 Act on Education Choice, Training and Professional Career Guidance*, formulated *Lifelong Learning Strategy of Denmark: Education for All and Improvement of Lifelong Skills for All*, and established a national qualification framework for lifelong learning.

III. The Danish Government is vigorously implementing educational informationization, including strengthening the infrastructure, providing information and communication technology education for teachers (and students), and the development of learning resources. Fourth, it provides security and improvement of working conditions and quality of life for talents, including flexicurity and work-life-balance strategy.

Table 6 Denmark's strategies to improve workforce quality and related measures

Education for all	**Lifelong learning strategy**	**Using digital learning resources**	**provides security and improvement of working conditions and quality of life for workforce**
➢ Compulsory education ➢ Top Talent Denmark China (programme); Top Talent Denmark Brazil (programme) ➢ Higher education: ➢ Enhancing vocational education and training ➢ Innovative teaching ➢ High academic standards ➢ Free Danish courses ➢ Higher standards	➢ *The 2003 Act on Education Choice, Training and Professional Career Guidance* ➢ *Lifelong Learning Strategy of Denmark: Education for All and Improvement of Lifelong Skills for All* ➢ National Qualifications Framework for Lifelong Learning	➢ Improving infrastructure of educational informationization: projects of teaching facilities building and upgrading; information technology planning of compulsory education schools providing main support for the hardware procurement ➢ Providing information and communications technology education for teachers (and students): the European Pedagogical ICT License, Information Professional Capacity Authenticate ➢ Learning resources development: EMU, UNI-Login, SkoDa, Skolekom	➢ Flexicurity strategy ➢ Work-life-balance strategy

I. A complete education system for all. Denmark has put in place a well-established and systematic education system, which has 19 levels including, from the bottom up, basic education, post-secondary education, vocational education and training, undergraduate education programs, undergraduate programs with specific majors, professional academic programs, master's programs and doctoral programs.

Compulsory education[41]. Basic education is compulsory in Denmark. The secondary education stage is designed to prepare for higher education, while the main purpose of vocational education and training is to train students who are going to work in trade or industrial fields. The assessment and evaluation framework of the compulsory education has a significant impact on the improvement of teaching quality and the development of the entire compulsory education system. The priorities of the assessment and evaluation framework are as follows:

(i) Promoting the combination of school teachers and principals' rewards within the framework. As honest professionals, teachers are increasingly carrying out their work in teams with the support of special advisors. The framework about educational standards within the compulsory education mechanism can reward teachers and provide a foundation for the career development of teachers. The teachers' occupational certification process within the system can determine the teachers' plans for career development and professional knowledge development. The school principals provide a dialogue mechanism for teachers every year.

(ii) Improving the key elements within the framework and specifying the goals of the elements. Schools and teachers will establish relevant performance standards when translating the assessment and evaluation frameworks into specific instructional evaluation programs to ensure the consistency of implementation and to engage students more actively in the evaluations on themselves.

[41] OECD(2011). *OECD Reviews of Evaluation an Assessment in Education: Denmark 2011.* Retrieved 9, April, 2018 from OECD website: https://read.oecd-ilibrary.org/education/oecd-reviews-of-evaluation-and-assessment-in-education-denmark-2011_9789264116597-en#page7.

(iii) Making investment to promote the development of assessment and evaluation capabilities at all levels. The promotion of assessment and evaluation capabilities within the compulsory education system includes efforts on multiple fronts: to better build teacher evaluation skills by providing adequate professional development and rely more on the help of special evaluation advisors on campus; to establish the capability profile targeted at school principals and heads of municipal education administration; to promote the schools' more systematic self-evaluation by implementing training for school leaders on the implementation of real teaching evaluations; and to strengthen the supervision of the municipal assessment framework, and ensure that these frameworks contain the evaluation of teaching quality. Fourth, promoting and supporting the evaluation and evaluation results to the maximized use. The new national-level test provides teachers with a powerful teaching tool.

Higher education[42]. Most Danish institutions of higher learning benefit from working with business, industry and research institutions to create a rich and vibrant learning environment for their students.

Among them, Top Talent Denmark China (programme) [43] (see http://www.toptalentdenmark.com.cn/) is an opportunity provided by Danish government for talents to get quality education in Denmark and to obtain a job in Danish companies in China or Denmark. By registering personal profile on website of Top Talent Denmark, one can become part of the talent pool. Three out of the world's top 200 higher education institutions are in Denmark. In 2007, Denmark and China reached an agreement on the mutual recognition of higher education degrees, which means that the Ministry of Education, PRC has recognized the degree conferred by Danish higher education institutions. The program offers a variety of courses, including: more than 700 degree programs, 1,300 English courses and exchange programs, short courses, and summer schools, etc. There are five types of educational institutions offered in the program: universities, university colleges, business schools,

[42] Danmark Goverment(2018). *Education for all*. Retrieved 3, April, 2018 from Danmark Goverment website: http://denmark.dk/en/society/welfare/education-for-all/.
[43] Danmark Goverment(2018). *Study in Danmarkl.* Retrieved 3, April, 2018 from Studyindenmarkt website: http://studyindenmark.dk/.

higher education institutions majoring in art, and maritime education and training schools.

In addition, Chinese students have the opportunity to receive Danish education in China. The newly founded Center for Education and Research (SDC) in Denmark is cooperating with China to provide Chinese students with the opportunities to receive Danish education in China. SDC is a joint project on education and research conducted by eight universities in Denmark, the Ministry of Science, Technology and Innovation of Denmark, the Graduate School of the Chinese Academy of Sciences, and the Chinese Academy of Sciences. The overall goal of the program is to promote and strengthen the cooperation between the two countries on the research and learning environment.

Strengthening vocational education and training. In addition to basic education and higher education, the Danish government also focuses on strengthening vocational education and training. Since the adoption of *The Copenhagen Declaration* in 2002, the Copenhagen process has made huge progress in vocational education and training (VET) in Europe, which is reflected in the promotion of the establishment and development of the common approach to vocational education and training throughout Europe and the sharing of good practices. A quality-oriented vocational education and training (VET) system has become mainstream in Europe. It was against this backdrop that Denmark published the *Danish Approach to Quality in Vocational Education and Training* report[44] in 2008. The report focuses on the the quality assurance and development approaches of Denmark's vocational education and training, including initial vocational education and training (IVET) and the quality assurance of continuing vocational education and training (CVET). The Common Quality Assurance Framework (CQAF) was chosen as the framework to describe the Danish quality policy and describes the overall policy priorities: employability, matching and usability.

[44] Denmark Government(2008).*The Danish Approach to Quality in Vocational Education and Training,* Retrieved 3, April, 2018 from Denmark Government website:https://www.uvm.dk/publikationer/engelsksprogede/2008-the-danish-approach-to-quality-in-vocational-education-and-training.

II. the lifelong learning strategy advocates that lifelong learning is a time-honored tradition of Denmark. Many Danes receive adult education to improve their knowledge and skills in an attempt to improve their professional know-how or change occupation. Thanks to their hard work, the workforce is constantly upgrading to meet the needs of the labor market.

Historically, Denmark's unemployment rate has been kept at a relatively low level. Although the rate grew rapidly from September 2008 to September 2009 (almost doubling to reach 6.4% according to the statistics from Statistics Denmark in 2009), it dropped "from 5.8% in mid-2013 to 4.9% in early 2015, thanks in large part to Denmark's lifelong learning strategy"[45]. The Danish word for "guidance" is "vejledning", which means "leading someone". Denmark passed the guiding principles of the *2004 EU Resolution of Lifelong Guidance (CoEU 2004)*, in which the guidance for lifelong learning includes information and counseling, skills for counseling, capability assessment, mentoring, advocacy, teaching decision-making and career management. In Denmark, guidance covers personal tutoring, tutoring, education and career guidance and counseling offered by schools, career guidance, and development and supervision of students in university and during university programs (Plant and Thomsen, 2012).

Denmark has formal legislation and detailed strategic objectives on learning guidance. According to the *2003 Act on Education Choice, Training and Professional Career Guidance*, guidance on education, training and career choice should help ensure individual choice of education, training and career on the one hand, and facilitate the development of the entire society on the other hand.

In this context, in 2006 Denmark unleashed a national strategy for lifelong learning: *Lifelong Learning Strategy of Denmark: Education for All and Improvement of Lifelong Skills for All*[46]. Aimed at building a lifelong education system, it points out the important role of vocational education in achieving lifelong education and outlines

[45] Zhang, Z.X.(2016).Lifelong guidance: How guidance and counselling support lifelong learning in the contrasting contexts of China and Denmark.*Int Rev Educ*,62:627–645.
[46] Denmark government (2007). Denmark's strategy for lifelong learning: Education and lifelong skills upgrading for all. Retrieved9, April, 2018 from docin website:http://www.docin.com/p-618342269.html.

the need to further improve the flexibility and inclusion of vocational education. Later, the Danish government started to develop and design the Danish National Qualifications Framework for Lifelong Learning (DK NQF) at the end of 2006. In 2013, the comprehensive evaluation of the framework was finished and it began to enter the advanced stage, facilitating the integration and communication of education of various types.

National Qualifications Framework for Lifelong Learning includes qualification education from compulsory education to high-level academic education and training systems, as well as general education, vocational education and training, higher education and adult education, etc. The framework emphasizes learning results, recognizes informal education outside of formal education, and breaks the limitations of time, space, contents, and methodologies in traditional education. The core elements of the framework include: learning outcomes, grading standards, the allocation principles of qualification degrees and certificates, and the Web edition of the national qualifications framework and database of qualification levels. (Denmark developed an Internet information tool, including the Web edition of the NQF and Database of qualification levels.[47]

III. Using digital learning resources. In addition to the Education for All strategy, Denmark has also vigorously developed educational informationization and made full use of digital learning resources. In the past 10-20 years, the Danish government has come up with many information and communication technology policies when it comes to education. The main ICT strategy is related to large government-funded projects. In the late 1990s, massive investment in infrastructure was made for the purpose of increasing Internet penetration. In the past 10-15 years, the educational information technology policy has focused on strengthening educational information infrastructure, providing information technology and

[47] Danish Ministry of Higher Education and Science (2018). Including certificates and degrees in the Qualifications Framework 10, April, 2018 from Ministry of Higher Education and Science of Denmark website: https://ufm.dk/en/education/recognition-and-transparency/transparency-tools/qualifications-frameworks/inclusion.

communication technology education for teachers (and students), and learning resource development.[48]

To improve the educational information infrastructure, the Danish government supports the following two programs: one is the construction and renewal projects of teaching facilities, and the other is the Information Technology Planning (ITIF) of compulsory education schools that provide major support for hardware procurement. Among them, the construction and renewal of teaching facilities is aimed at providing construction and renovation for educational facilities at day care centers and public schools. Since 2010, the Danish Ministry of Education has launched a project that can provide regional governments with $800 million in funding. Although the funds for this project are not limited to investment in information technology, they are an important part of the investment in information development. In this way, the Danish Ministry of Education encourages local governments to improve the ICT infrastructure of local schools through applying for the funding of the project.[49] As it is widely believed that 9 is the minimum age for accessing ICT, the project funds are only available for Grade-3 students to purchase information hardware equipment. The local governments involved in the project also needs to provide funds to update the ICT infrastructure for students above the 4th grade. Local governments of Denmark are all involved in this funding project. Promotion and catalyzing is conducted at the national level, while the government is responsible for procurement. The funds for this project are mostly used for procurement of interactive whiteboards and laptops.

The government provides ICT education for teachers (and students). To be specific, the government implements the European Pedagogical ICT License (EPICT) programme for practicing teachers and the Pupils' ICT License for students:

48 OECD (2009). OECD Study on Digital Learning Resources as Systemic Innovation: Country Case Study Report on Denmark. Retrieved 3, April, 2018 from OECD website:http://www.oecd.org/dataoecd/33/40/42033180.pdf.

49 Dong Hongjian, Xu Fangzho: *Overview of Educational Information Application in Denmark, Journal of World Education*, 8,27-32.

The EPICT provides a series of on-the-job training courses for teachers' professional development. It introduces a comprehensive set of standards to measure the quality of educational information technology application, guided by the idea that teachers' skills training must be based on reasonable teaching practices. The phrase "no basis, no skill" is a good summary of the programme's core idea. This series of training courses is available at major universities and local teaching centers. In general, one class of the course can accommodate 20 teachers and students, and online teaching is applied for this course almost in every case. Due to the initial success of the programme in providing ICT basic skills training, the Ministry of Education has sponsored the development and promotion of high-level career development modules such as professional information technology courses. However, teachers haven't shown much interest in these advanced courses, probably because of the amount limits that teachers face when paying for the courses, or due to the major structural reform carried out by local governments when the new initiatives were put in place.[50]

In addition to the courses for teachers, the Pupils' ICT License programme is targeted at students, through which they can choose to obtain an ICT certificate.

The government is also committed to the development of learning resources, including the establishment of EMU (Electronic Meeting Place for the Educational World), UNI-Login, SkoDa, Skolekom and other data service systems and portals:

The EMU is a national portal to provide learning resources for schools, universities and adult education. Initiated and sponsored by the Ministry of Education in 1999, it is operated by UNI-C. EMU refers to Electronic Meeting Place for the Educational World, providing a variety of information resources relevant to students, teachers and parents. The idea is to establish a central portal for information relevant to the educational world. It has a number of sub-websites, including thematic information guides, electronic museums, SkoDa and the National Learning Resources Database (Materialeplatformen), most of which are provided for free. The EMU portal

[50] Dong Hongjian, Xu Fangzho: *Overview of Educational Information Application in Denmark*, *Journal of World Education*, 8,27-32.

was not built from scratch. Rather it inherited the early service developed and maintained by UNI-C.

EMU is of great importance in ICT/DLR policies of national education. The OECD expert panel has fully confirmed that EMU is the backbone of the digital learning resource system of Denmark and the main instrument of the implementation of national ICT and digital learning resource policies in the education sector. EMU is mainly used by individuals, while other resources mainly serve the needs of relatively large groups and institutions.[51]

3.3 Poland: Government-Sponsored Balanced Regional Development

The key national Strategy for Responsible Development (SOR) programs currently carried out in Poland include the Package for Medium Sized Cities Program, the Program for Silesia and the Partnership City Initiative. These three programs all respond to the SOR's requirement for improving workforce' quality. The detailed information is as below:

Table 7 Requirement for Workforce' Quality Improvement in Programs

The Package for Medium Sized Cities Program	The Program for Silesia	The Partnership City Initiative
➢ Smart Development Program: a diversity of training and meeting arrangement facilitating entrepreneurship and innovative development. ➢ Knowledge Education Development Program: Educational support measures for different types of employees and unemployed persons ➢ Infrastructure and	➢ It includes a complete and comprehensive development policy agreement, focusing on urbanization and industrial revitalization. ➢ Measures that encourage and facilitate the transformation and upgrading and innovative development of traditional industries	➢ Enhance and encourage cooperation and knowledge exchange between partners ➢ Improve skills of human resources ➢ Take a bottom-up approach to deliver the capitalization of knowledge and systematic solutions ➢ Social players participate in urban management ➢ Implement national and

[51] OECD (2009). OECD Study on Digital Learning Resources as Systemic Innovation: Country Case Study Report on Denmark. Retrieved 3, April, 201from OECD website: http://www.oecd.org/dataoecd/33/40/42033180.pdf.

Environment Program: measures to boost flows of labor in the domestic market ➢ Eastern Poland Program: Revitalization and development program that is conducive to labor flows	➢ Enhance the workforce' capacity to adapt to the demand of the labor market	European urban development policy

The Medium Sized Cities Development Plan (the Package for Medium Sized Cities), as one of the national-level action plans, is in the direct charge of the Minister of Investment and Development of Poland. This package includes the Knowledge Education Development Program (2014-2020), the Smart Development Program, the Infrastructure and Environment Program and the Eastern Poland Program[52]. The highlight is the Smart Development Program, with a total input of 900 million POLISH ZLOTY, accounting for 36% of the total project funding. The four programs mention the improvement of labor quality in the following parts:

In the Smart Development Program, the Ministry of Investment and Development of Poland, by leveraging on the European Social Fund (ESF), has launched 268 training activities and conferences in support of citizen and enterprise development in different regions and provided free training since 2015 (and as of May 11, 2018); facilitated SME development and helped employers train employees and improve the quality of investments[53]. The Knowledge Education Development Program mainly targets public administrators, local government departments (including social relief organizations) and their employees, organizations of social assistance and inclusion and their employees, graduates of schools and educational institutions, employees of the education system, medical staff, SME employers and employees, young people up to 30 years old without work and elderly people with the intention to work. The program supports the unemployed youth to access training, internship, employment subsidies and entrepreneurship assistance as wrapped in the

[52] SOR Key Strategic Programs Introduction, Ministry of Investment and development of Poland, 2018.website:http://www.miir.gov.pl/strony/strategia-na-rzecz-odpowiedzialnego-rozwoju/kluczowe-projekty/.
[53]European Regaional Development Fund and Technical Assistance Plan (Poland: Knowledge Education Development Program), Ministry of Investment and Development of Poland, 2018 website:.http://www.poir.gov.pl/strony/o-programie/szkolenia/#/domyslne=1.

youth employment initiative. It also aims to realize the modernization of labor market institutions through effective public policies, develop higher education to meet the demands of economic growth and labor market, encourage transnational mobility of young workforce, and train medical staff to improve the health conditions of workforce[54].

The program is managed by the Ministry of National Education of Poland and is funded by the European Social Fund (ESF), the state budget, and the Youth Employment Initiative (YEI). This program only gets a budget of 9.7 million POLISH ZLOTY from the Medium Sized Cities Develop Program (Package of Medium Sized Cities), but due to the importance of training and education in improving the workforce' quality and employment, the *Strategy for Responsible Development* (2020) has earmarked 5.4 billion euro for the program and over 2 billion euro will be devoted to the improvement of the quality and employment of the youth. The Infrastructure and Environment Program and the Eastern Poland Porgram don't cover the education and training aiming to improve workforce' quality, but they create conditions for mobility, especially transnational ability, and provide access to more job opportunities[55].

The Program for Silesia is one of the projects of the *Strategy for Responisble Development* adopted by the Council of Ministers on February 14, 2017. It is one of the key areas of intervention at the national level to boost regional economic development[56]. This program has an integrated development policy, covering metropolization and reindustrialization. As a medium- and long-term program, it aims to transform and upgrade traditional industries (steel, automobile manufacturing, electricity) in a long term, gradually lower the proportion of traditional industries in economic development and foster new areas of growth (pharmaceutical industry,

[54] European Regional Development Fund and Technical Assistance Plan (Poland: Knowledge Education Development Program), Ministry of Investment and Dvelopment of Poland, 2018 website:http://www.power.gov.pl/strony/o-programie/zasady/co-mozna-zrealizowac/.
[55]European Regional Development Fund and Technical Assistance Plan (Poland: Eastern Poland Program), Ministry of Investment and Dvelopment of Poland, 2018 website: http://www.polskawschodnia.gov.pl/strony/o-programie/zasady/dla-kogo-jest-program/.
[56] The Porgram for Silesia, Ministry of Investment and Development of Poland, 2018.website：http://www.miir.gov.pl/strony/strategia-na-rzecz-odpowiedzialnego-rozwoju/kluczowe-projekty/program-dla-slaska/.

smart device manufacturing) through technological innovation and application.

The content concerning the improvement of labor quality in the Program for Silesia is to improve local residents' quality through professional projects, which is led by the Labor Bureau of the Katowice Voivodeship and the European Social Funds Department under the Polish Ministry of Investment and Development with a budget of 9.11 million Polish Zloty (about RMB 16.56 million). As described in the program, it is of particular importance to increase the adaptivity and support should be rendered to young people under the age of 29 in personal career counseling, career planning and job hunting. The University of Silesia will support to address the high-quality labor demand of social and economic growth as planned in the program.

The Partnership City Initiative (PIM) is a program of exchange and promotion of knowledge between cities and other entities involved in the shaping and implementation of urban policies. It is an important project in the SOR to achieve balanced regional development and addressing urban development is highlighted in the initiative.[57]The main goal of the initiative is to improve development conditions and support the integrated and sustainable development of Polish cities. Specific objectives include:

I. Strengthening and encouraging partner cooperation and knowledge exchange;

II. Improving the skills of human resources;

III. Capitalization of knowledge and development of bottom-up proposals for system solutions;

IV. Dissemination of the principles of social participation in city management;

V. Involving cities in the implementation of national and European objectives. Among them, improving the skills of human resources imposes enormous impact on the improvement of labor quality. To boost mobility, PIM emphasizes the necessity to improve regional information and transportation channels.

[57] SOR：Partnership City Initiative，Ministry of investment and development Poland，Retrieved 26 January 2018， website：http://www.miir.gov.pl/strony/strategia-na-rzecz-odpowiedzialnego-rozwoju/kluczowe-projekty/partnerska-inicjatywa-miast/.

3.4 Belgium: Government-Business Partnership in Developing Social Training Institutes

Belgium adopted the Employment and Skills Strategies[58] and Boosting Skills for Greener Jobs[59]. The most unique approach to improve labor quality is by introducing social cooperative partners like businesses, social organizations, community organizations and other non-official agencies.

Table 8 Employment and Skills Strategies and Boosting Skills for Greener Jobs, Belgium

Employment and Skills Strategies	Boosting Skills for Greener Jobs
➢ Employment services management: Flanders is the most experienced in managing employment services, including employment services, career services, vocational training and assessment of competences. ➢ Collective bargaining and social dialogue: Parity is critical to this mechanism, meaning the negotiating parties are equal. ➢ Vocational education and training system: The first stage offers comprehensive and basic courses, the second stage provides vocational options, and the third stage completes all courses	➢ Adjustment of the current training, education and qualification system ➢ More policy support to green skills in the transition to green economy ➢ There will be more private sector participation in public-private partnership. Industry platforms can facilitate cooperation between businesses and across sectors. Universities and vocational training institutes can co-develop knowledge sharing platforms ➢ Skills transformation is extremely important as we are shifting from the traditional brown industries to green economy. Though technological substitution and job reshuffle will not materialize immediately, it is a slow yet irreversible trend

Employment and Skills Strategies. Belgium has gradually recovered from the slight economic contraction in 2012, but the long-term structural problems in labor market has remained, featuring the decrease of new jobs, high structural unemployment, high unemployment among youth and seniors and flocking

[58] OECD Reviews on Local Job Creation，Employment and Skills Strategies in Flanders, Belgium，Retrieved 2018，from：http://www.oecd.org/belgium/employment-and-skills-strategies-in-flanders-belgium-9789264228740-en.htm.
[59] OECD Green Growth Studies，Boosting Skills for Greener Jobs in Flanders, Belgium，Retrieved 2018，from：http://www.oecd.org/belgium/boosting-skills-for-greener-jobs-in-flanders-belgium-9789264265264-en.htm.

low-skilled migrants. This is the market background. Across Belgium, the power of Federal (Central), regional (Flanders, Wallonia and Brussels), community and language area(Dutch, French and German) governments are conflicting. Regional governments dominate local social and economic agenda, and since employment policy is often deemed a local issue, different regions can make their own labor market policies. If governments hope to dominate the policies, they must have it written in their agreement with social partners. This is the political background.

Belgium's current labor market policies are based on regional and community (language area) conditions, therefore varying greatly. However, they resemble EU's framework, covering almost all aspects of labor market, ranging from workplace diversity, career guidance, workforce flow, education system, entrepreneurship, labor dispute settlement in public and private sector, socioeconomics, employment measures, labor migration and policy departments. This is the policy background.

The Strategies include:

Employment services management. Flanders is the most experienced in managing employment services, including employment services, career services, vocational training and assessment of competences. The best examples are VDAB (the agency for public employment services), Public Social Welfare Center (OCMW), local employment agencies (PWA) and other local employment promotion plans.

Collective bargaining and dialogue. Parity is a critical to this mechanism, meaning the negotiating parties are equal. From Flanders' experience, it is crucial and prominent to have a council or committee with strong network and influence to coordinate the collective bargaining between trade unions (or other employees' organizations) and employers' organizations, especially in terms of socioeconomic policy making and implementation. The Flemish Socio-Economic Council (SERV) is such an organization that coordinates the bargaining between employers' organizations and trade unions. It is also a consultative body focusing on socioeconomic topics like work, education, training, social protection, diversity and innovation. Another one is the Flemish Economic and Social Consultation Committee (VESOC), a consultative body that mediates when employers' organizations and trade

unions negotiate with the government on socioeconomic issues. If consensus is reached, the government must comply. At sub-regional level there are SERR and RESOC sponsored by the Flemish government, which are similar to SERV. As the intermediary among employees' development, employers' interest and government policies, they play an important role in formulating labor market policies, yet their influence on policies depends on local institutional and political circumstances.

Vocational education and training system. Basic education before the age of 18 is compulsory in Belgium. After that comes the three-stage secondary education. The first stage offers comprehensive and basic courses, the second stage provides vocational options, and the third completes all courses. Full-time schools offer general education (ASO), technical education (TSO) and vocational education (BSO). Secondary vocational schools offer part-time courses, namely the "substitutive secondary education".

Apart from these, there are VDAB training programs, Flemish entrepreneurship training and labor training co-provided by regional technological centers (RTC) and social partners[60]. It is worth noticing that instead of providing training directly, RTCs coordinate between education institutes for better connection among businesses, secondary training institutes and adult education institutes to share equipment, infrastructure and faculty.

Green skills for the green economy transition. According to OECD in 2017, green economy will redefine many jobs and skills. The transition to green and resource-efficient green economy can only materialize by developing the right skills, knowledge and abilities. OECD defines the skills as "the knowledge, abilities, values and attitudes needed to live", and believes that "skills to support innovation and adaptability will be as important as technical skills, as industries will gradually adapt to the need to better harness and dispose of resources". As an EU member, Belgium's major policies are within the parameters of EU framework. EU's green economy transition is the inevitable path for Belgium, so is the issue of green employment.

[60] Businesses are major players in these programs, responsible for design, implementation, assessment and feedback. They are the most important social partners.

OECD proposed five policy support recommendations:

I. Public policy coordination can be optimized.

II. “Portable” skills (which can be transferred from one job to another) and lifelong learning should be fostered.

III. Market developments should match regulatory activity.

IV. Policy implementation should be more transparent to make SMEs better adapt to policies.

V. Investments in R&D should be enhanced.

According to OECD’s research in 2014, green skills require training and education institutes to cooperate with local participants in an integrated manner, i.e., current jobs may change due to green economy, therefore calling for adjustment in training, education and qualification system. There will be more private sector participation in public-private partnership. Industrial platforms can facilitate cooperation between businesses and departments. Universities and vocational training institutes can co-develop knowledge sharing platform to boost local innovation and reduce corporate training cost.

For workforce, skills transformation is extremely important in the transition from the traditional “brown” industries to green economy. Though technological substitution and job reshuffle will not take place immediately, it is a slow yet irreversible trend. Moreover, because of technological transition, new jobs may not favor those who lose jobs due to a phase-out of certain industries.

3.5 Germany: Training Assistance, Employment Services and Employment Security

As the origin of modern insurance, Germany introduced social security in delivering ample job trainings and services, linking employment security with vocational training and employment services, therefore providing basic security and catering to labor’s pursuit for self-development.

Table 9 German approaches to improving labor quality

Training assistance	Employment services	Employment security
➢ Education support services ➢ Vocational guidance ➢ Entry training ➢ Vocational preparatory training ➢ Graduate assistance ➢ Vocational training subsidy ➢ Transition from school to work	➢ Free employment assistance from public service agencies ➢ Employment and job-seeking operations of the private sector ➢ Education support ➢ Basic employment security ➢ Unemployment benefits	➢ Vocational medical services ➢ Vocational security and health ➢ Technical security ➢ Social security and welfare policies ➢ Inclusive employment security

By July 2018, the registered unemployed in Germany went down by 193,000 to 2.325 million, the lowest in July since the 1990 reunification. The unemployment rate was 5.1%. There were 823,000 registered job vacancies, an increase of 72,000 from the previous year. Hubertus Heil, Federal Minister of Labor and Social Affairs, pinpointed skills shortage as a critical issue, which became increasingly prominent in many fields and industries.

Now the German government has taken these measures:

I. Offer education support services, vocational guidance and employment preparatory courses that help less qualified youth to gain diploma and transit smoothly from school to work.

II. Provide employment services through private or public sector.

III. Take a range of employment security measures.

As to ***training assistance***, education support services aim at providing vocational training opportunities to young people. For young people at the start of their career, the German government thinks it necessary to support them during transition from school to work, including free guidance, employment services and vocational training. Besides, young people can benefit from the Employment Promotion Act. Education support services include vocational preparatory training, orientation training,

vocational training subsidy, supplementary training tools, vocational training for the unemployed, houses for youth and etc.

Vocational preparatory training is a 10-month full time training by training institutes, providing hands-on practices and trainings across different fields. Federal Employment Agency provides pre-employment training based on pre-employment measures. Guided by the principle of open content design, through comprehensive ability analysis, the training identifies employees' knowledge, skills and ability as well as flaws in academic, theoretical and practical fronts. Besides, the individual support plan designs steps of vocational training—trainees attend vocational schools to get hands-on practice, to learn vocational integration and enter the labor market via pre-employment opportunities, so as to reduce training cost in a production-oriented approach.

Entry training applies to applicants who fail to find a training venue and young people in a precarious condition or inappropriate to take vocational training. It is a long-term internship in businesses, and participants are expected to acquire basic vocational skills based on professional requirements. Certificated could be granted at the request of participants. Besides, employers or businesses that provide primary entry training could obtain a maximum of €231 monthly subsidy to cover cost and pay social security for the trainees.

Vocational training subsidy aims at overcoming the economic difficulties, supporting the compensation in the training market and improving talent flow. The amount of subsidy depends on the type of accommodation, the number of apprenticeship training subsidy and the annual income of parents, spouse or partners. The maximum is €622. As a mandatory benefit of employment promotion policies, the subsidy is provided in vocational training, pre-employment training and external vocational training, if other conditions are met.

Regarding ***employment services***, free public employment services are an integral part of public services and the core of modern services in labor market. However, private employment agencies can also help job-seekers to find jobs. Public employment agencies could provide basic employment services and benefits to

job-seekers, while private service providers may bring extra job opportunities. The placements by employment agencies and public employment institutions are often supported by integrated services, which could be delivered by many tools.

Employment security measures include vocational medical services, vocational security and health, technical security and professional social security and welfare policies, as well as inclusive measures targeting the disabled and other vulnerable groups.

4. China Follows the Human Capital Lifecycle Theory to Systematically Improves the Workforce Quality

At the current stage of high-quality development, the Chinese government has proposed and implemented a range of policies and measures to enhance workforce quality of different regions, groups and professions. Policies by group are of the biggest number and richest content. Table 9 shows a whole set of education policies to enhance workforce quality and adequate focus on its overall strength. Skills honing and training policies mainly target the workforce of the right age, but lifelong learning policies are not adequately planned and rely on education and training policies, without an independent policy framework.

Table 9 Policy Matrix to Enhance Workforce Quality by Group

Policies \ Group	Ordinary labor	Migrant workforce	University graduates	Left-behind children in rural areas	Unemployed	Seniors	Disabled
Overall quality	√	√	√	√		√	√
Education	√	√	√	√	√	√	√
Skills	√	√	√		√		√
Training	√	√	√		√		√
Lifelong learning	√		√				

Data source from current policies

4.1 Focusing on Nutrition Balance for Good Health and Improving Overall Quality of Workforce

Physical and mental quality is the foundation for workforce cultivation. Only with high quality can labor be better educated and trained, so as to create value at

work.

The *Outline of Healthy China 2030 Plan* made specific instructions on the basis, targeted groups, major substances, approaches and guarantees, making it the guiding document for China's health cause. On the basis of this document, more specific and targeted health policies are needed for different regions, groups and occupations.

4.1.1 Consolidating Region-based Professional Health Guarantee

Rural rejuvenation strategy is an integral part for practicing new development philosophies and building a modern economic system. It must be combined with people-centered development approach and ensure good physical and mental health of rural residents, which are the talent basis for rural rejuvenation.

Rural areas are the source of migrant workforce, and it is vital to protect their health. We must focus on providing basic nutrition, guaranteed by a well-established health care system and supplemented by mental health services, so as to strengthen the overall quality of rural residents.

I. Improve the quality of food supplied to rural areas, prevent the supply and selling of fake, counterfeited and inferior food, and address excess pesticide and veterinary drug residue. Focus on small food processing workshops, wholesale markets, fairs in townships and towns, rural kindergartens, primary and middle schools and nearby food shops, as well as their canteens by considering the high-risk hours for rural food consumption.

II. Satisfy rural residents' nutrition demand, pay special attention to the condition in impoverished rural areas, and consider adding nutrition as another criterion for poverty relief evaluation.

III. Improve rural health care. As rural population shrinks, health care resources in neighborhood areas could be integrated by merging health centers in townships and towns, so as to enhance service quality through bigger size and reduce waste of rural health care resources. Yet this must be supported by well-built roads and well-established medical talents.

IV. Pay attention to the mental health of rural residents. Make great efforts to develop people's awareness of mental health through health survey, education or even

intervention conducted by cultural centers in townships and towns.

Supply-side structural reform raises higher demand for multiple industries, particularly manufacturing industry. Health care in industrial clusters must be industry-based and problem-centered, oriented towards problem prevention. Professional health care programs with industry characteristics can be developed from different fronts.

I. In terms of physical health, industrial clusters share similar occupational diseases. Taking precautions against certain diseases can make polices and measures more targeted and efficient. For instance, based on the *Law of the People's Republic of China on Prevention and Control of Occupational Diseases*, government can cooperate deeper with medical institutions where manufacturing businesses concentrates. In key provinces to phase out backward industrial capacity like Hebei and Shanxi, while transforming and upgrading steel and coal industries, more stringent occupational disease precautions could be combined with environmental protection equipment and green technology, so as to be environmentally- and labor-friendly.

II. Mental health is most urgently needed in service industry. In service-dominated areas we can consider financial support, i.e., government purchases the service of mental health institutions and encourages service industry employees to take mental health counseling and intervention. We can start in provinces with well-developed e-commerce services like Zhejiang and Jiangsu on a trial basis, and offer mental health services to online customer service employees in Hangzhou and Shanghai.

4.1.2 Adopting Group-based and Targeted Health Development Policies

With region-based guarantee measures satisfying regional demand, we can consider supplementary health development policies targeting particular groups to ensure policy coverage. For example, the health of infants and young children mainly concerns basic nutrition, especially the trace elements for those in rural areas. More health development resources can be allocated to rural areas through professional nutrition improvement programs. In poor rural areas where nutrition guarantee is

missing, more services can be added to the current "nutrition kit", allowing professional and non-profit agencies to offer early stage development services to infants and young children through fiscal subsidies and donation.

In their growth, mental health has critical influence on future mental development[61]. Regarding the mental health of the left-behind children in particular, given bad family relations, we must make migrant workforce aware of children's mental health education, and arrange more mental counselors in health centers in townships and towns with a big number of left-behind children.

4.1.3 Developing Diversified Health Nursing Services

Industrial clusters must ensure efficient, targeted and fine-tuned health guarantee according to major categories of occupational diseases. For areas without strong suit industries, they can take into account the job mix and the consumption capacity of targeted groups, take advantage of the high momentum of general practitioners program, and provide universal basic health guarantee with wide coverage, diverse fronts and comprehensiveness.

Specifically, there can be cooperation between local labor unions and health nursing institutions to offer labor diversified and selectable health nursing services. Service agencies need to expand businesses from different perspectives to satisfy demand. Financial support can come from subsidies, labor union fees or mutual assistance by staff themselves.

4.2 Extending the Length of Education for Better Quality and Enhancing Workforce Education System

Education is the necessary preparation for labor before entering the labor market. It is the preliminary stage for them to survive and grow.

Workforce education not only concerns their self-development, but also serves as one of the decisive factors for socioeconomic and national development. It deserves careful, comprehensive and systemic thinking. Education is a fundamental cause,

[61] Fang Fengjuan, Chen Guopeng, Qi Weiying, Evaluation and Thinking of Young Children's Mental Health[J]. Psychological Science, 2006, 29(2):493-495.

whose institutional improvement requires guidance in strategic orientation, development targets and philosophies and fit in the socioeconomic dimension. We must start from compulsory education to go through and re-understand the role and significance of policy substance, participants and market mechanism.

4.2.1 At Macro Level: The Leading Role of Governments at All Levels

Education is a macro and general issue of universal benefit. Instead of being solely resolved by a single region, social force and market mechanism, it requires overall consideration at national level and top-down efforts of governments at all levels to implement reform measures and provide problem feedback.

I. The institutional development of compulsory education and higher education must be coordinated at national level. The length of compulsory education can be extended properly, which is possible considering China's overall economic prowess and students' qualify. We can start from eligible places like Beijing and Guangdong, or in Shandong, Hebei and Henan Provinces with a big number of students on a trial basis for 2-3 years to accumulate experience, so as to learn the financial condition, infrastructure and faculty. We can lower the minimum age for compulsory education to 4-5 years old to cover part of the pre-schooling. The expense can be partially paid via the financial transfer from pre-schooling. In 2015 Belgium adopted a bill to lower the minimum age to 5 years old and has remained ever since, without incurring too much financial pressure. Another option is to add high school to compulsory education, extending the total duration to 12 years. But this approach is not only financially burdensome, but also faces challenges in school construction and faculty. In poor rural areas where compulsory education is the most fragile, financial incentives are adequate. More support can go to roads, school canteens, security and hygiene. Whether children are left behind or not, they should be granted equal convenience. However, for the sake of family education, left-behind children deserve more spiritual guidance and living care.

II. Lower the threshold of higher education gradually and help students to develop skills that are more compatible with labor market demand. The former encourages lifelong learning, which targets graduates from technical colleges and

adult higher education, encourages them to further education through diversified assessment standards, better manages self-study exams in higher education in a professional manner, and creates specific channels so that vocational school students and other groups can take the college entrance exam again. For instance, technical college graduates can be admitted based on the evaluation of their professional skills, like the form of admitting students with special talent during the college entrance exam. The latter demonstrates improvement in the substance and standard of higher education. Compatibility with the labor market is more than encouraging students to take internships, it also aims at developing hands-on skills based on actual demand for students who study the majors that are popular in the market, However, it must be noted that theoretical and academic disciplines must be distant from market mechanism, so as to ensure a diversified and multi-layered talent pool.

III. Local governments and departments concerned must ensure education fairness, eliminate inequalities in gender, age and regions and strive to ensure equal access to education opportunity and infrastructure. Based on local economic conditions and demand, governments at all levels should build and improve education infrastructure, establish the public service system of digital education resources and provide such services. Particularly when it comes to extending the length of compulsory education, regional education resources must be coordinated effectively, including the size of middle and primary schools, number of enrolled students and faculty. More enrollments can be allocated to rural areas, so as to avoid the concentration of quality education resources in a few schools during compulsory education.

4.2.2 At Medium Level: Strengthening the Participation of Different Players

Regarding school development,

I. Make efforts to further consolidate education infrastructure and improve faculty. Develop our teachers and also bring qualified teachers from overseas. There are mandatory requirements for normal university students to work as teachers upon graduation, but more flexible entry mechanism and scientific exit mechanism are needed.

II. Encourage primary and middle schools and institutions of higher learning to innovate their way of teaching, including video teaching and summer camp, so as to realize liberal education.

III. Support and regulate private education, establish its information system and encourage the participation and support from businesses and individuals.

For social participation, except for building schools, other approaches include setting up education fund to provide financial guarantee. The seed money can come from the government or donation from businesses and the society. We must ensure that government money exit timely when the fund can develop in a sustainable manner, so as to prevent red tape and bureaucracy. This could reduce financial pressure from in the midterm financial plan, and ensure the fund to function flexibly and efficiently. At the same time, we need to focus on coordination and regulation through public, legal and sustainable investment rules, regulate the investment of private funds, ensure security and improve operation. Besides, we must strictly limit the profitability of private schools run by society and businesses earned from school sponsorship fees and textbooks (equipment), therefore ensuring charity and fairness in compulsory education. For reasonable profit-seeking of businesses, we can compensate by tax incentives and returns.

4.2.3 At Micro Level: Creating the Environment for the Sustainable Development of Education System

Education system and policies at the grassroot level mainly involve teachers, students and parents. The sustainable development of education system requires their joint efforts.

I. Teachers should be properly oriented when cultivating students. Liberal education must be reflected in what is taught. Make sure all teachings center on students' future development and eliminate the negative impact of teaching to the test and evaluating students only by test scores. Guide teachers to go back to the standards of satisfying students crave for study and knowledge.

II. Students are the core of education, and their needs point to the future development of education. Since the college entrance exam holds great sway, it is

difficult for students to grow in all dimensions. However, this does not deny the demand for all-round development, and well-targeted cultivation based on ability, interest and reality must not only be written in documents, but also be practiced in classes. Yet it goes beyond the scope of students, schools and even local governments, therefore requiring top-down changes at national level.

III. Gradually change parents' mentality for better cooperation between family and school. Education is both the school's obligation and family's responsibility. Guide and encourage parents to be engaged in students' education, organize more parenting activities on moral and ethics teaching. Parents are vital for good family relations.

4.3 Encouraging School-Business Cooperation for Education-Industry Integration and Improving Hands-on Ability

According to the *Work Priorities of the Ministry of Education in 2018*[62], given that middle and higher vocational education institutes' effort to integrate education with industry is the last chance for students to enhance working ability before entering the labor market, we must cater to market demand, understand students' ability and strengthen the integration, so as to deliver the effect of school-business cooperation and education-industry integration. From the experience of European Center for the Development of Vocational Training (Cedefop), helping labor to gain hands-on experience, work in labor market and during vocational education and training and advocating work-based learning can further enhance their skills and efficiency.

4.3.1 Marketization as Main Channel

The main channel of marketization aims at addressing the incompatibility between education and labor market, skills and market demand, thus forcing schools to change the current mode of internship. In this context, marketization applies to the internship mechanism, including consulting corporate opinions in designing period,

[62] Ministry of Education (2018).*The Work Priorities of the Ministry of Education in 2018*, retrieved 14 June, 2018 from Ministry of education of PRC website: http://www.moe.gov.cn/srcsite/A02/s7049/201802/t20180206_326950.html

strengthening corporate instruction during internship, and enhancing the feedback mechanism of internship performance. These measures can effectively connect discipline setting with industrial demand, teaching with production, diploma with occupation certificates, as required by *Opinion of the Ministry of Education on Modern Apprenticeship on a Trial Basis*[63]. This promotes the integration of student and employee recruitment and deepens the approach of talent development.

In higher education, we need to deepen the comprehensive reform of postgraduate education with a Master's degree in practical fields by establishing practice centers and deepening the reform in doctoral education pilots. Innovate new modes of education like video, summer camp, flipped classroom, participatory learning, case or research study, action learning, service or work-based learning.

4.3.2 Apprenticeship as Priority

Modern apprenticeship can help industries and businesses participate in the whole chain of talent development, therefore making quality higher and better targeted.

I. Uphold the principle of "government leadership and coordinated progressing", balance the development demand of schools students and profit-seeking businesses. There are examples in recent years of schools colluding with businesses to undercut students' interest. We must set the tone that schools are not just dispatching, students not toiling and businesses not doing philanthropy. We must regulate schools' internship programs, protect students' interest during internship and guarantee businesses' pursuit for profit.

II. Advocate "cooperation for win-win and shared responsibility" when implementing the contracts between students and businesses, as well as schools and businesses. The former encourages the integration of student and employee recruitment, and the latter combines the mode of talent development with business demand.

III. Combine school cultivation, business demand and regional development plan

63 Ministry of Education (2014). *Opinion of the Ministry of Education on Modern Apprenticeship on a Trial Basis*, retrieved 14 June, 2018 from Ministry of education of PRC website: http://old.moe.gov.cn//publicfiles/business/htmlfiles/moe/s7055/201409/174583.html

in a tailor-made and categorical manner, providing talent support for industrial upgrade and further development in different regions.

IV. Adopt a development-oriented approach to tackle the problems in pilot areas during system design and making key breakthroughs, especially when it comes to student recruitment eligibility, assessment, curriculum design and teaching research, from the long-term perspective of education-industry integration and school-business cooperation.

4.3.3 Morality and Skills of Equal Importance

Establishing and improving the mechanism of morality and hands-on practice education requires a systemic design of morality-oriented approach and deepening reform of basic curriculum. For school-business cooperation and education-industry integration with apprenticeship as priority, it aims at cultivating labor befitting market and business requirements. It is also responsible for enhancing labor's work ability and skills. However, from the previous experience of vocational education institutes, moral education has not been given adequate attention, and better work and skills may not necessarily bring better mentality and morality. Therefore, we must value moral education in apprenticeship pilots, especially integrity, law-abidingness and spirit of the contract when students enter the market.

4.4 Arranging Curriculum Scientifically to Enhance Skills and Strengthening Labor Training

To deliver the targets set by the *Opinion of the State Council on Lifelong Skills Training Mechanism* and satisfy labor training demand by 2020, cultivate massive numbers of highly skilled talents and hundreds of millions of high-quality labor, we need to arrange curriculum scientifically and strengthen labor training.

4.4.1 Legislation Coming First to Guarantee Labor's Training Right

Being trained is the legitimate right of labor to make career plan and improve themselves. In the new era of a complicated and changing labor market under supply-side structural reform, except for the existing Labor Law, Employment Promotion Law, Labor Contract Law and Vocational Education Law, we need bylaws,

local laws and judicial interpretations to further consolidate the legal framework for the rights, applied individuals, principal organizing bodies and source of fund concerning labor training.

I. At national level, add more content on employee training into Labor Law. Make concrete stipulations on the time, category and source of fund of skills training divided by industry or group, especially for the massive dispatched labor. We can learn from Belgium's legislation on labor training and make the training right a mechanism. Specify the rights and obligations of dispatched labor training through government purchasing and business cooperation, and make clear that the fund comes from government finance (the bigger share) and individual contribution (the smaller share). It should be noticed that the level of marketization in Belgium is different from China, therefore we must be cautious whether to have social partners.

II. At local level, make *Temporary Approaches to Labor Training* or *Temporary Bylaws on Labor Training* based on previous documents, so as to regulate and instruct labor training in terms of the substance, target and incentives.

4.4.2 Diversify the Substance to Expand the Scope of Labor Training

Training diversification should be based on industry and technological development.

I. Adapt to the actual demand of industrial transformation and upgrade. Telling from EU and China's supply-side structural reform, green and sustainable development is the mega trend for all industries in the future, and the changing mode of production in manufacturing and other industries requires labor to renew their knowledge and hone skills. Like Belgium's strategy of Boosting Skills for Greener Jobs, we can adopt national strategies to reform the current training, education and professional qualification system based on green economy and technology. At the same time, we link business' policy sensitivity with government's policy influence, and abandon the outdated mode of "training employees only when government requires". Take the mode of "policy shift--business equipment upgrade--employee skills upgrade", unleash businesses' skills demand after equipment renewal and labor' s training demand for job-seeking, so that green economy could greatly impact labor

skills. It must be mentioned that businesses need to help new employees to "learn in practice", accumulate experience and improve skills at work.

II. Training must extend from traditional to emerging technological fronts. We should take into account the guiding role of hi-tech on economy, the skills demand on employees from digital economy and artificial intelligence, and labor's career plan. Besides, we need to strengthen automation technology training based on FMS and Seru[64] in traditional industries and manufacturing.

4.4.3 Changing Models and Innovating the Pattern of Labor Training

According to foreign experience, the trend of skills training could be understood as a matrix that is led by government, mainly organized by businesses, market-oriented and aims at skill-demand compatibility, with clear direction, strong participants, effective mechanism, comprehensive substance and balanced supply and demand.

The priority is to accelerate the development of training institutes. We need to gradually change the pattern of government-led training, and instead introduce market mechanism, facilitate eligible businesses to build vocational schools and other types of training institutes. Encourage qualified training institutes to independently organize professional and big-scale training programs, and cooperate properly with vocational schools in operating apprenticeship on a trial basis. Places with multitudes of manufacturing and service employees can learn from the pattern of training institutes, like encouraging the development of some skills training institutes oriented towards market demand and building paradigm vocational training blocs. If market demand is weak, we can first identify the trend of future industries, sectors and technologies and then stimulate training demand by industrial and fiscal incentives.

Besides, we can learn from European Center for the Development of Vocational Training and establish vocational training centers to improve labor quality and skills, which helps to make and implement vocational training policies in China and monitor

[64] Seru is a Japanese word coming from Seru seisan, which means Seru production. It is an efficient and pliable way of production that could change according to different production tasks and applies to diverse categories and small market. Since inception, Seru has become popular in Japanese manufacturing industry, adopted by many electronic companies.

the trend of labor market based on China's data on education and training policies.

4.5 Developing Job Market, Improving Employability and Creating More Jobs

Work is the fastest way to enhance individual quality. China encourages apprenticeship, which aims at helping students to adapt to labor market promptly, smoothly and orderly. In the new age, as the supply-side structural reform exerting tremendous impact on economy, we must create more jobs on a stable basis, so that the labor market could adapt to the change.

4.5.1 Creating More Jobs

Maintaining a stable and prosperous labor market requires more jobs, a stable stock, bigger increase and higher quality. Emerging jobs, charitable positions and volunteer programs are potential areas of growth. Besides, the report of the 19th National Congress of the Communist Party of China identifies railway, road, waterway and airway as infrastructure priorities in the future, which not only drives growth in downstream industries like steel, metallurgy and equipment manufacturing, but also creates more jobs. Unlike previous attempts to create jobs through infrastructure, this report raises higher demand for infrastructure building, particularly for high-speed rail construction, demanding new and better quality and types of steel, therefore must be supported by better equipment, technologies and workforce.

Besides, the new employment model featuring sharing economy is more flexible than traditional ones and better adapt to market. It creates more flexible jobs via the Internet, therefore should be open to a broader public. According to the *New Jobs, High Quality--Report on the Employment Quality of China's New Forms of Employment*, which was lately released by China New Forms of Employment Research Center, School of Labor Economics, Capital University of Economics and Business, from June 2017 to June 2018, 30.66 million people earned money from Didi Chuxing (a mobile transportation platform), up by 9.58 million from the previous year. It shows that more people are choosing new forms of employment as an important source of income for livelihood, household and a better life.

Other than this, we must pay attention to the employment issue of certain groups, particularly university graduates. More policy incentives can be adopted to send graduates to critical regions, projects, programs and fields. Require universities to release the annual report of graduates' employment condition, and gradually form the synergy among employment, student recruitment, talent development, fund appropriation, school arrangement and discipline adjustment.

4.5.2 Providing More Convenience for Start-ups

At current stage, policies and measures to encourage university students to innovate and start business have taken shape. However, incentives are absent for other groups, especially for migrant workforce, who are among the three groups facing the biggest difficulty in job-seeking.

Based on previous experience, fiscal and tax support is the most effective approach. In the context of a new type of urbanization, migrant workforce is an integral part of broadening the channels to start business and build wealth, which is mentioned in the 13th Five-Year Plan to Promote Employment. More friendly fiscal and tax policies must be provided to returning migrant workforce to start business, i.e., maintaining the current policy to encourage rural workforce emigration, and offering more policy directions for returning migrant workforce to start business, so as to ensure them more choices while maintaining the employment channels for rural workforce.

On one hand, we should improve institutional support for returning migrant workforce. The rural areas with a multitude of migrant workforce need to offer equal start-up incentives as urban areas, providing a favorable environment regarding entry, public and financial services, fiscal and tax support and collateral guarantee. On the other hand, more fiscal expenditure needs to go to transportation, hydropower, roads, venues and telecommunication in order to consolidate the infrastructure basis. The development of start-ups can be integrated with township and village enterprises to boost the industrialization of agriculture, increase the sustainability of start-up projects and unlock potential job opportunities in rural areas.

4.5.3 Covering a Broader Social Spectrum

The 13th Five-Year Plan to Promote Employment set the targets of "driving employment through diversified demands" and "forging a start-up service platform for all and develop start-up cities". To deliver the targets, we need to extend support from prioritized groups to all eligible individuals, from first-time entrepreneurs to second-time or veteran entrepreneurs, so as to make the resources more open and better utilized.

I. Improve the scope and level of employment and start-up skills training. Lower the threshold of eligibility to expand the pool of targeted trainees. Identify start-up training demand to put in place the training system combining classroom education with self-study and hands-on practice with guiding assistance.

II. Government could purchase public services to open the technologies and education resources of laboratories, vocational schools and technological parks to the public. This could reduce training cost, increase resource efficiency and improve employment and start-up capacity as a whole.

4.6 Enhancing Infrastructure to Create Incentivize Workforce's Lifelong Learning

Lifelong learning strategy is a critical juncture to improve workforce quality, as shown by EU and its member states. Given China's present education system, to encourage and realize lifelong learning, strategies need to be made in a top-down approach to develop training institutes and provide guarantees. The *2030 Sustainable Educational Development Goals* proposes access to lifelong learning of all citizens[65], yet it takes efforts on all fronts to turn opportunity into reality.

4.6.1 Making Lifelong Learning Guiding Strategies

As most lifelong learning policies depend on education and training policies, to deliver the role of lifelong learning mechanism, we need to establish a body to develop and recruit researchers, so as to understand the real scenario of continuing

[65] Ministry of Education (2016). *2030 Sustainable Educational Development Goals*, retrieved 14 June, 2018 from Ministry of education of PRC website: http://www.moe.edu.cn/s78/A23/A23_ztzl/ztzl_kcxfz/201601/t20160104_226738.html

education and vocational training received by workforce, and learn their need for development after exiting the workforce market.

I. Establish agencies to for lifelong learning strategy, policy research, supervision and evaluation based on current institutional design, so as to ensure the continuity and efficiency of the strategy. Focus on young people, who are the mainstay of current workforce, cater to their career development demand and make detailed provisions on the basis of national development plans regarding the substance, path, approach, rights and obligations and source of fund. Run pilot programs in areas where large population flows in, focusing on migrant workforce. Grassroot workforce unions could issue education and training coupons to combine migrant workforce' demand to enhance skills, the wide coverage of workforce unions and the marketization approach of government purchasing services.

II. As to hands-on practice mechanism, we can consider establishing a lifelong learning national qualification framework based on existing skills training policies. The mechanism includes qualification education from compulsory to high-level academic education and training, as well as general education, vocational education and training, higher education and adult education. All these will help to develop and implement the national qualification framework. We could draw from Denmark's lifelong learning national qualification framework to establish "multi-layered" professional agencies to implement lifelong learning and other policies at national level.

4.6.2 Implementing Lifelong Learning Policies

Except for workforce training, continuing education and adult education must be included as an integral part of lifelong learning strategy.

As to higher education, efforts can be made based on current adult education policies to further manage the disciplines of continuing education with higher education diploma, and regulate continuing education of universities. Guide university construction and development, accumulate pilot program experience in the authentication and transfer of continuing education, strengthen the management of higher education self-study exam and create special channels to allow vocational

school students and other groups to take the college entrance exam again.

For vocational education, we should guide schools especially vocational schools to conduct continuing education, further enhance migrant workforce' education background and skills, continue to develop the demonstration counties of vocational and adult education at national level. Accelerate the development of a learning society, community education and senior education, build learning cities and organizations.

4.6.3 More Incentives for Lifelong Learning

I. At policy level:

(i) Enhance the awareness of lifelong learning through publicity and implementation for the vision of lifelong learning involving all individuals across the social spectrum throughout the life cycle. The awareness campaign should focus particularly on migrant workforce and manufacturing employees.

(ii) Provide lifelong learning incentives like awarding "education coupons" for certificate holders and high fliers, which could be used to acquire further knowledge and education.

(iii) Launch "Reading for All" Campaign to encourage people to read and study, regardless of age, occupation and family condition, helping to foster an environment friendly to lifelong learning policies.

II. At infrastructure level: Provide venues and facilities for lifelong learning in addition to current ones. Apart from mobilizing institutions of higher learning, vocational training institutes and privately-sponsored training institutes, we should take advantage of urban community cultural service stations and cultural centers in townships and towns, and continue to develop national level demonstration counties of rural vocational training and adult education. We need to accelerate the growth of a learning society, develop community and senior education, establish learning cities and organizations.

4.7 Market Players Enhancing Policy Dynamics to Ensure Concrete Results

Targeted policy recommendations on improving workforce quality and guarantee and supporting mechanisms must be arranged regarding workforce's overall quality, education, skills, training and lifelong learning, so as to deliver concrete results.

I. Improve workforce health. Government should

(i) Deepen medical and health institutional reform, strengthen a sound financing mechanism and accelerate the transformation of government functions;

(ii) Beef up the talent pool, increase health training and adopt a motivating evaluation for innovative talents;

(iii) Innovate health technologies, establish a system of medical technology innovation for progress.

II. To strengthen the institutional strategies for workforce training, government must enhance the guarantee for sustainable education:

(i) Step up the management of education input, supervise governments functioning in education expenditure, further consolidate the guarantee mechanism for compulsory education expenditure, strengthen management and regulate fee collection, and advance the management system reform in universities and businesses;

(ii) Advance informatized education, make great efforts to ensure education resources are shared by all, set up exemplified informatized classes and promote the use of Internet learning. Strengthen the top-level design of informatized basic education, build and utilize the vocational education resources pool to promote the integration of information technology and education;

(iii) Maintain campus security, beef up security supervision and make policies and recommendations for control and prevention.

III. Government must improve the guarantee mechanism for making the hands-on practice policies for workforce.

(i) Education bodies at all levels must scientifically arrange pilot programs of arranging students' hands-on practice, and make localized strategies and

implementation approaches;

(ii) Strengthen the organizational guarantee for implementation, arrange staff for supervising, coordinating policies and encouraging cooperation among businesses, industries and schools.

IV. Strengthen workforce training. Government should improve the rule of law in labor market, so that companies and market are regulated by law. Make well-established laws to protect the legitimate rights and interests of workforce, improve social security and level of protection. Measures to enhance workforce quality also requires legal guarantee.

V. To guarantee the success of enhancing workforce quality via employment, government should improve employment feedback mechanism and service system, including:

(i) Collect, analyze and release the employment condition of university graduates, strengthen the mechanism of annual employment quality report and set rational indicators;

(ii) Enhance the employment feedback mechanism of university graduates via tracking;

(iii) Provide more targeted employment services.

VI. Promote lifelong learning mechanism. Government should

(i) Beef up leadership at organizational level. Governments and bodies of human resources and social security at all levels must follow the instruction of the Central Government to prioritize lifelong learning in supply-side structural reform, formulate long-term plans for lifelong learning based on local visions for socioeconomic development, employment and talent cultivation, and ensure policy implementation;

(ii) Guarantee public finance. Ministries of Human Resources and Social Security, Education, Industry and Information Technology, Civil Affairs and Finance need to have more financial input in lifelong learning, provide subsidies and strengthen supervision and feedback;

(iii) Optimize social environment. The Ministry of Human Resources and Social Security, Ministry of Education, All-China Federation of Trade Unions and the

Communist Youth League of China should promote the publicity of lifelong learning in new approaches, so as to improve policy influence and public awareness. Schools and businesses can cooperate in launching skills competition.

Conclusion

In the new era, high quality development is essentially a model guided by new development philosophies. To improve workforce quality in this context, we need first to understand the essence of high-quality development, and then integrate the demand of labor market with the theory of human capital life cycle, so as to learn the requirements for workforce at different stages, the circumstances and problems of the overall quality, education, technology, training and lifelong learning, and offer solutions and recommendations based on workforce' s demand at different stages.

Specifically, we need to combine new development philosophies such as innovative, coordinated, green, open and shared development with factors that affect high quality growth. We must learn from international experience to bring out the essence of high-quality development. Besides, we should think in terms of the human capital life cycle theory and take into account the guarantee measures of workforce's overall quality since their birth, study the requirements of high-quality development on workforce in terms of education, work, training and lifelong learning after exiting the labor market. Compare the results with the status quo and find room and feasible approaches to further enhance workforce quality. In this process, we need to fully learn from international experience in enhancing workforce skills, especially how EU and its member states combine market mechanism with policies in workforce education and training amid economic model transformation, therefore offering a renewed vision and more alternatives to guarantee workforce's right to education and training and promoting lifelong learning.

It should be noted that there are unique Chinese characteristics in improving workforce quality against the backdrop of high quality development. The uniqueness is not confined to the special government-market relationship under socialist market economy. In the current stage of China's economic development, the impact of burgeoning new economic forms and the deep application of digital technology and artificial intelligence in certain industries on labor market are unseen by other

countries and regions before, which calls for localized Chinese ideas, policies and measures. This article does not discuss this adequately, and we eagerly hope experts and scholars on workforce and employment can pay attention and work together to improve workforce quality in the context of high-quality development.

References

[1] Alexandra Dehmel. Making a European area of lifelong learning a reality? Some critical reflections on the European Union's lifelong learning policies[J]. Comparative Education, 2006, 42(1):49-62.

[2] Communities C O. A Memorandum on Lifelong Learning[J]. Adults Learning, 2000:15-17.

[3] Chen S. What is the new normal economy? http://www.qstheory.cn/laigao/2015-03/19/c_1114688943.htm,2015-3-19.

[4] Chen Z，Xie M，Zhang W. Analysis of gender differences of education opportunity gender equality and education results in China [J]. Higher engineering education research, 2003(2):19-22.

[5] China's center for disease control and prevention. Report on Nutrition and Chronic Disease Status of Chinese Residents（2015）[R].2015-7-7.

[6] the Chinese Academy of Engineering. 2015 China Manufacturing Power Development Index Report [R].2016-7-1.

[7] Danish Ministry of Higher Education and Science. Danish Qualifications Framework for Lifelong Learning[Z].2018-4-9.

[8] Danish Ministry of Higher Education and Science. Including certificates and degrees in the Qualifications Framework[Z]2018-4-10.

[9] Denmark Government. Education for all[Z].2018-4-3.

[10] Denmark Government. Study in Denmark[Z].2018-4-3.

[11] Denmark Government. The Danish Approach to Quality in Vocational Education and Training[Z].2008.

[12] Dong H, Xu F. Informatization overview of education in Denmark [J], World education information，8,27-32.

[13] Disease prevention and control bureau. Guidance on strengthening mental health services [Z].2017-1-19.

[14] European Union. Lisbon Strategy[R].2010.

[15] European Union. Europe 2020[R].2010-3-3.

[16] European Commission. Growth, competitiveness, and employment: the challenges and ways forward into the 21st century[R].1993.

[17] European Political Strategy Center. The Age of Artificial Intelligence: Towards a European Strategy for Human-Centric Machines[R].2018-3-27.

[18] Education culture DGF, Training ECFOV. Implementing lifelong learning strategies in Europe: progress report on the follow-up to the Council resolution of 2002: EU and EFTA/EEA countries[J]. European Commission, 2003.

[19] European Commission. Science, Research and Innovation Performance of the EU, 2016[R].2016-3-10.

[20] Fang F, Chen G, Qi W. Current situation and thinking of children's mental health assessment [J]. Psychological Science, 2006, 29(2):493-495.

[21] Federal Planning Bureau, Belgium. Economic Outlook2018-2030[R].2018-3.

[22] Federal Government, Germany. The Digital Agenda[R].2017-4-26.

[23] Hu Y, LI J. Hot issues and frontier issues in domestic and international research on Economics of Education since the 21st century -- knowledge map analysis based on Education and Economics and Economics of Education Review [J]. Education and the economy, 2018(2).

[24] Ministry of Investment and Development, Poland. Strategy for Responsible Development until 2020[R].2016-9-27.

[25] Ministry of Education. 2030 Education Sustainable Development Goals [Z].2016-1-4.

[26] Ministry of Education. Opinions of the Ministry of Education on the Pilot Project of Modern Apprenticeship [Z].2014-8-25.

[27] Ministry of Education. 2016 National Statistical Report on Education Development [R].2017-7-10.

[28] Ministry of Education. Guiding Opinions of the Ministry of Education on the Construction and Application of the Public Service System for Digital Education Resources [Z].2017-12-21.

[29] Ministry of Human Resources and Social Security. Notice on Student Financial Management in Technical Colleges and Universities in 2018 [Z].2018-3-15.

[30] Office for Official Publications of the European Communities. Environment 2010: our future, our choice: the sixth EU environment action programme 2001-2010[R].2001.

[31] OECD. Overview of the education system (EAG 2017) [R].2018-5-22.

[32] OECD. OECD Reviews of Evaluation an Assessment in Education: Denmark 2011[R].2011.

[33] OECD. OECD Study on Digital Learning Resources as Systemic Innovation: Country Case

Study Report on Denmark[R].2009.

[34] OECD. OECD Reviews on Local Job Creation, Employment and Skills Strategies in Flanders, Belgium[R].2015-3-27.

[35] OECD. OECD Green Growth Studies, Boosting Skills for Greener Jobs in Flanders, Belgium[R].2017-2-20.

[36] OECD.OECD And the Sustainable Development Goals: Delivering on Universal Goals and Targets[R].2017.

[37] Proceedings of the 15th national historical symposium, Economic development mode and its thinking before and after reform and opening, 2017(1).

[38] Sellin B. Scenarios and Strategies for Vocational Education and Lifelong Learning in Europe: Summary of Findings and Conclusions of the Joint CEDEFOP/ETF Project (1998-2002). CEDEFOP Panorama Series. [J]. 2002, 4(3):206-15.

[39] Selected works of MAO Zedong, vol. 3, Renmin Press ,1991.

[40] Sun B. Report of the Fifth Council of the China Staff Education and Vocational Training Association [R].2017-3.

[41] The 19th National Congress of the Communist Party of China. Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era [R].2017-10-18.

[42] The People's Daily. Education fairness is by no means egalitarian [N].2016-6-16.

[43] The People's Daily. Responsibility and mission to promote equality between men and women [N].2015-3-8.

[44] the State Council. The outline of the 13th five-year plan for national economic and social development of the People's Republic of China [R]. 2016-3-17

[45] the State Council. The 13th five-year plan for employment promotion [Z].2017-2-7.

[46] United Nations Development Programme, Human Development Report 2014. 24, July,2014

[47] Van Vught F. The EU Innovation Agenda: Challenges for European Higher Education and Research. [J]. Journal of Higher Education Policy & Management, 2009, 21(2):9-9.

[48] Woessmann L, Schütz G. Efficiency and Equity in European Education and Training Systems[J]. Eenee, 2009(100).

[49] WHO. Depression and other common mental disorders: global health estimates[R].2017-9.

[50] Yu X. Status and development of public nutrition [R]2018-8-2.

[51] Zhang J, Dong Z. Education equity: interpretation of ideas, analysis of current situation and policy approach [J]. University education science, 2017(1):42-48.

[52] Zhou F. Problems and Suggestions in the Construction of Vocational Education and Training System for Highly Skilled Talents [J]. Education and Vocation, 2017(22).