INCLUSIVE INNOVATION AND POLICIES TO PROMOTE INCLUSIVE INNOVATION IN CHINA AND IMPLICATIONS FOR VIETNAM

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Summary:

Over the past several decades, China has achieved rapid development based on science and technology (S&T). However, this rapid growth model based on S&T also creates consequences such as inequality, gap between rich and poor, and depletion of natural resources. To cope with emerging challenges and achieve the goal of sustainable development, in addition to restructuring production industries and the policy of building a harmoniously developed society and a favorable socio-economic context based on S&T, China has achieved many successes in implementing many programs and initiatives with the content and characteristics of innovation covering a large scope and scale. Currently, China is also facing many difficulties and challenges and is faced with many choices regarding inclusive innovation policies such as building a common strategy and policy on inclusive innovation, continuing to improve mechanisms. Specific policies on inclusive innovation are based on a deeper understanding of the needs of excluded groups. However, the successes in inclusive growth that have been achieved in recent years and the policy challenges in implementing inclusive innovation that China is facing will suggest many lessons for developing countries including Vietnam for reference and learning when developing innovation policies for inclusive growth, so that no one is left behind.

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1. Context for implementing inclusive innovation in China

Over the past few decades, especially from 2000 onwards, China has achieved rapid development, with an average annual GDP growth rate of more than 10%. Like many other countries in a period of rapid development, China's rise is largely based on high-tech products and export-oriented industrialization. However, the rapid growth model based on science, technology, and innovation (STI) on the one hand makes the economy grow rapidly and significantly reduces the number of people living in poverty, but on the other hand has also leading to unwanted consequences such as: widening the gap between rich and poor and income inequality between population stratums as well as consuming and depleting natural resources.

The problem is how to achieve rapid growth based on STI, while ensuring sustainable development, not increasing the gap between rich and poor and

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reducing income inequality between population stratums, between urban and rural areas. To cope with the challenge of sustainable development, the Chinese Government has proposed building a national innovation system and implementing many policies focusing on the values of research and development, and on commercializing and absorbing knowledge to transform the previous development model, mostly based on overexploitation of natural resources, and to restructure the production industries.

To overcome the gap between rich and poor between regions and remove difficulties and challenges faced by small and medium-sized enterprises and other potential problems arising in the process of development based on globalization, creating momentum for sustainable growth based on STI, the Chinese Government has implemented many programs and initiatives to mobilize the participation of all people's stratums in innovation activities for sustainable development. With policy changes and experiments, a new growth model - inclusive growth based on innovation[2] - has increasingly penetrated the Chinese economy, contributing to reducing the gap between rich and poor and social inequality, towards a future of sustainable development, and harmonious and prosperous society.

2. Overview of inclusive growth and inclusive innovation

Inclusive growth is a socio-economic concept that aims to increase economic growth and improve the quality of life for all people in each region or community. The concept of inclusive growth was first introduced and supported by economists at the World Bank and Asian Development Bank. In 2003, the World Bank proposed the issue of inclusive growth in the report Globalization, Growth and Poverty: Building an Inclusive World Economy. The Asian Development Bank also proposed that inclusive innovation is a development process that creates broad-based participation and specifically reduces poverty and social exclusion *(Chatterjee Shiladitya, 2005).*

Thus, inclusive growth is aimed at overcoming current economic development problems such as the gap between rich and poor and unsustainable exploitation of natural resources. The measure of inclusive growth is to create a sustainable business and development environment, ensuring that all relevant factors benefit from economic growth.

However, inclusive growth also requires changes in a country's policy design and economic structure and requires the consensus and cooperation from other countries to achieve this goal. One of the main solutions to achieve the goal of inclusive growth is assigned to inclusive innovation.

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[2] In China, inclusive growth was officially named by President Hu Jintao in September 2010 at the end of the 11th Five-Year Plan (2006-2010). The 12th Five-Year Plan (2011-2015). That momentum marked the transformation of China's development perspective from "pursuing economic growth" to "sharing the benefits" of development for all.

2.1. Inclusive innovation, the role and identity of inclusive innovation

So, what is inclusive innovation? Inclusive innovation is a fairly new concept, appearing since the 2010's and increasingly attracting the attention of both researchers and policymakers. In 2013, the World Bank defined inclusive innovation as: *any innovation that expands access to quality products and services at affordable prices to create and increase livelihood opportunities for excluded population groups*[3]. In 2014, the Organization for Economic Cooperation and Development (OECD) also said that inclusive innovations are those that help improve the welfare of low-income groups and, more broadly, of excluded groups *(OECD, 2014c).*

Inclusive innovation aims to directly respond to the needs of improving the welfare of excluded groups based on the efforts of the government, businesses, social organizations, communities, and individuals. At the same time, inclusive innovation also aims to reduce development gaps between regions, between urban and rural areas, and between countries.

The concept of inclusive innovation is quite suitable for developing and underdeveloped countries, where poverty leads to the exclusion of most of the indigenous population, not only from the ability to access and enjoy the benefits that advances in S&T can bring but also exclude them from accessing social welfares that can help address their basic needs.

2.2. Roles and characteristics of inclusive innovation

According to OECD (2014b), inclusive innovation has the following roles: (i) Help businesses and society continue to develop without encountering problems such as resource depletion or environmental pollution, thereby promoting sustainable development; (ii) Enhance competitiveness through creating competitive advantages and enhancing the prestige of businesses and countries in the international market in the process of globalization and integration; (iii) Help solve social challenges by finding new solutions to complex social problems, from health and education to energy, environment and safety and security; (iv) Help create new values through new products, services and solutions that bring added value to society.

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[3] *The excluded population group* here is understood as a group of people who are weak, vulnerable, have little or no ability to access and enjoy the benefits that scientific and technological progress brings as well as are excluded from access to social benefits and welfare.

Characteristics of the excluded population: (1) Limited capacity or innovation skills (entrepreneurship, management skills, digital knowledge, technological skills, creative capacity due to lack of vocational training and education); (2) Few opportunities to fully participate in innovation activities (due to discrimination in the labor market related to gender, age, race, religion, ethnic origin or place of residence; Due to living in underdeveloped and deprived areas, development opportunities and opportunities to build business linkage networks are limited, and especially due to barriers when accessing financial resources).

Excluded groups can vary according to different contexts, for example: women, young people, disabled people, low-income people, ethnic minorities, even entire communities living in remote and mountainous areas, or small and micro enterprises, individual economic households, and craft villages producing small-scale goods using traditional methods can all be subjects that need to be concerned with inclusive innovation.

The goal of inclusive innovation is for inclusive growth, which means creating conditions for all segments of the population in different environmental conditions to have the opportunity to participate together in economic activities and contribute into growth and share the fruits of economic growth equally.

Inclusive innovation is a sustainable economic solution that contributes to solving the problem of inequality and developing a sustainable and harmonious society. Therefore, along with other policy tools, inclusive innovation is an important tool that policymakers can use to support excluded and disadvantaged groups with the state's policy framework and help solve problems of community integration and social harmony.

According to the United Nations Conference on Trade and Development *(UNCTAD, 2014b)*, an innovation is called inclusive when it has the following characteristics: (i) Social: aims to provide sustainable and low-cost production solutions so that businesses can easily apply it when meeting the basic needs of excluded groups; (ii) Provide products and goods at reasonable prices, suitable for the payment ability of the excluded group, while the quality and effectiveness of the products or services provided are not affected; (iii) Be accessible to excluded groups and aim to eliminate economic and social barriers when accessing products or services for excluded people due to differences in quality of life; (iv) Have a positive impact on the lives of excluded groups and create livelihood opportunities to attract excluded groups to participate in innovation activities; Finally, (v) It is not simply a "good idea or wish" or only useful to a small group, but needs to create a wide access to a significant number of excluded people in order to reap large-scale benefits.

2.3. The difference between inclusive innovation and traditional innovation and some other innovation concepts

Innovation, according to the standard/traditional understanding of economics[4], is the process in which new ideas are created, and commercialized, and ended by bringing these new ideas to market with the goal of achieving success commercially - that is, new innovations that make economic sense and are usually implemented in enterprises. According to another academic understanding[5], innovation is the implementation of a new or significantly improved product (good or service), a new or significantly improved process, a new marketing method or a new organizational method into business practices, work organizations or external relationships. In most countries, including Vietnam, the concept of innovation is also understood by default as activities

[4] The concept of innovation according for economic understanding is associated with the name of the Austrian economist, father of the economic theory of innovation, Joseph A. Schumpeter.

[5] For example, according to the OSLO Manual for Collecting, Reporting and Using Data on Innovation (*2005, 2018*): Innovation is the implementation of a new or significantly improved product or process, a new marketing method, or a new organizational method in business practices, workplace organization, or external relations.

associated with businesses or other organizations (such as research institutes, universities, hospitals, or other service organizations) to help economic growth and focus mainly on technological innovation activities in production and business to serve export or domestic markets. These standard/traditional innovation activities are often aimed at the market for majority of consumers, and with little relevance or for the minority of the excluded group consumers.

Inclusive innovation, in essence, is still the process of creating new ideas, making efforts to commercialize and introduce new ideas to the market with the main goal of achieving commercial success. However, from the point of sustainable development view, inclusive innovation has a different development perspective than that of innovation in the traditional sense: while innovation in the common sense is considered as the main driving force of productivity, competitiveness of enterprises, economic growth and associated with the perspective of economic growth in general. On the contrary, inclusive innovation embraces the clear concept that development in positive conditions needs to include groups of excluded people, that is, those outside the general development trend, bringing them into the mainstream development process to achieve the "no one is left behind" goal.

From this difference in development perspectives, inclusive innovation has mentioned new aspects of innovation that aimed at excluded groups of people, at those who are not noticed and are considered marginalized. In fact, in recent times, several different models have appeared to seek development for excluded, low-income communities and are all related to inclusive innovation such as: grassroot innovation[6], cost-saving innovation (frugal innovation[7]), or innovation for the poor (pro-poor innovation) and innovation for the underprivileged in society (innovation for base of the pyramid).

Table 1 below helps us clearly distinguish the similarities and differences between the concept of inclusive innovation and the concept of traditional innovation as well as some other pro-inclusive innovation models.

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[6] *Grassroot innovation* - is a bottom-up approach to develop solutions for excluded groups that meets and addresses the local needs and values of the communities involved. Grassroot innovation not only aims to serve excluded groups but is also initiated, implemented, and controlled by these excluded groups themselves in the process and results of innovation. Grassroot innovation is often promoted by local activists, entrepreneurs and volunteers working in civil society fields and is rooted in local knowledge, based on local people's values and beliefs.

[7] *Cost-saving innovation (frugal innovation*) - is a type of innovation that aims to overcome resource scarcity, helping minimize the use or take advantage of existing resources in the production and circulation of products and goods in more economical ways. In this innovative way, products and services often have lower costs, allowing to set lower product unit prices by retaining only the most important functions and core quality characteristics of the product and services (For example: low-cost car Tata Nano made in India). Lower prices allow low-income groups to purchase products or services with those innovations.

Note that, not all *frugal innovation* products are of lower quality or have lower specifications than products designed for the affluent market. Frugal innovations can also be developed in rich, developed economies and used to improve the welfare of excluded groups or poorer segments of the population there.

Table 1. Comparison of concepts of innovation

	Inclusive Innovation	**Grassroots Innovation**	**Frugal Innovation (pro-inclusive innovation, OECD)**	**Standard/traditional Innovation**
Main factors/agents	Excluded groups	Local communities, civil society organizations, social entrepreneurs, grassroots activists, NGOs, or social movements	Local communities, civil society organizations, social entrepreneurs, grassroots activists, NGOs, social movements, and businesses.	Universities and research institutes, state management agencies (Ministry of Science and Technology - MOST), businesses (entrepreneurs)
Priority level	Aiming for access to products and services for excluded groups	Aiming for social values, livelihoods, and sustainable development	Overcoming resource scarcity and affordability.	Economic growth, improving productivity and competitiveness of businesses
Orientation	The need for access to essential products and services for excluded groups	Social needs, voluntariness, cooperation	Minimizing the use of resources or utilize existing resources in the production and distribution process	Market demand, authority of actors, reputation
Implementation resources	Social capital, development assistance, grant funding, public finance	Social capital, grassroots ingenuity, indigenous knowledge, development assistance, grants, public finance	Micro, small and medium-sized enterprises, domestic corporate enterprises, multinational corporations, state-owned enterprises, and non-profit organizations	Public finance, venture capital, corporate investment, scientific expertise, and training
Type of knowledge	Provide basic knowledge and create access for excluded groups	Tacit knowledge (experiential knowledge, subjective observations, and skills of individuals, including values and beliefs)	Tacit knowledge (experiential knowledge, subjective observations, and skills of individuals, including values and beliefs)	Codified knowledge (rational and objective knowledge, systematized scientific and technical knowledge)
Positioning activity	Serving excluded groups	Local communities, villages, neighborhoods, social movements	Micro, small and medium-sized enterprises, large domestic corporations, multinational enterprises, state-owned enterprises, and non-profit corporations	R&D centers, laboratories, ministries, industries, businesses, and markets

Source: compiled by the authors.

In short, inclusive innovation, understood in its full meaning, is a concept/term that refers to innovation activities/models that aim to address the needs of the excluded, focusing on providing basic products[8] or services[9] that are lacking for those in the excluded group, to address the problem of inequality, protect the vulnerable, leave no one behind and aim to increase inclusive growth in a sustainable society.

3. Status of inclusive innovation programs and initiatives in China, success factors and challenges when implementing inclusive innovation

To narrow social inequality, China has implemented many programs and initiatives on innovation and focuses on encouraging all organizations, individuals, businesses, and communities to participate in the innovation activities for the goal of inclusive growth[10]. In this process, China is very interested in introducing new technologies and technological improvements to production and consumption. Such innovations not only help increase productivity and economic efficiency but also improve the quality of life of the entire population and the environment.

3.1. Status of inclusive innovation programs and initiatives in China

China does not have a common strategy and policy that directly talking about the topic of promoting inclusive innovation, more precisely, it does not have a strategy and policy that directly uses the name of inclusive innovation. However, with the goal of harmonious social development, the Chinese Government has implemented a series of programs and initiatives with content bearing the characteristics of inclusive innovation. Based on the review of programs and initiatives with content characterized by inclusive innovation implemented in China, in 2013, the World Bank published a report on the results of analysis and assessment of the status of these programs and initiatives related to inclusive innovation in China. In its announcement, the World Bank used the national innovation system approach to analyze the roles of the Government, research institutes and universities, businesses as well as the grassroot innovation initiatives for beneficiaries that are low-income people and those who are excluded in rural areas. The analysis results are presented briefly as follows:

a) The programs and initiatives of the Chinese Government

The Chinese government has made many efforts to promote innovation involving rural people and excluded populations. A typical example is the Spark

[8] Typical products such as: foot pedal washing machines, rainwater filtration systems, portable waterless toilets, biodegradation systems, environmentally friendly housing... or initiatives implemented in education to help older people from excluded groups acquire the knowledge, and skills necessary to fully participate in economic activities and social and cultural life.

[9] Basic services such as: clean water, sanitation, electricity and transportation, health care, education, technology, financial services, food security,...

[10] Although not officially called inclusive innovation, but innovation activities in programs and initiatives serving farmers and rural areas (such as the Fire Spot Program), all have the nature of innovation for inclusive growth, that is, inclusive innovation.

Program[11,] established in 1986, with the purpose of disseminating advanced technology and applications for agricultural and rural development. In addition, other programs and initiatives were launched in the health care, educational and medical sectors in the late 1990s, aimed at disseminating technology to rural hospitals and clinics.

When the policy of building a harmonious society was placed at the top of the Government's agenda, many efforts were made by Chinese Government to promote innovation targeting excluded groups. During the 11th Five-Year Plan (2006-2011), various programs were implemented in areas such as sanitation, health, education, transportation, energy, and ecological environment to serve excluded population groups[12.] During the 12th Five-Year Plan (2011-2015), the Chinese Government strengthened technology development to improve livelihoods, with several priority areas closely related to innovation, including strengthening the promotion of and popularize agricultural technology and develop a national IT health system.

The government has used public funding sources to support inclusive innovation, including funding for basic research and funding for commercialization, dissemination of innovation, and transformation from the role of sponsor and single funding-supplier model to attract private sector investment in specific areas. Fiscal policy has also promoted the participation of private enterprises in the low-income market[13.]

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[11] The Spark Program was initiated by the MOST of China in 1986 and quickly spread to most localities across China. The name of the Program is taken from the proverb "A small spark can start a whole field of fire", with the goal of helping transfer and disseminate technology and knowledge to rural areas, stimulating the development of local agriculture and other industries, benefiting farmers and rural households.

The Spark Program has gone through three stages of development: *before 1994*, the Program focused mainly on supporting businesses in towns and villages through grants and technology training for farmers and solve local technological problems by using know-how from research institutes; *Since 1994*, the main source of funding for Spark Programs came from bank loans and capital mobilized by participants, and the program began to support private enterprises and rural entrepreneurs. During this period, local governments began to play a leading role in selecting, implementing, and supporting programs; *Since 2005*, the scope of the Spark Program has become more comprehensive, including promotion of rural IT, rural S&T projects, technology training for farmers and rural entrepreneurs, support the establishing rural technology parks and rural industrial clusters, promoting innovation, and disseminating technology to the poor,...

Projects are often proposed by the Ministry of Agriculture and the local Department of S&T, then approved by the Chinese MOST. Most of the investment capital comes from banks and private enterprises, while local governments also provide some counterpart matching financing. This reflects a change in China's investment strategy: from focusing on funding research and development projects to encouraging cooperation between businesses and organizations to improve the efficiency of technology research and development.

[12] Outstanding results include: Remote Health Support Initiative by IT organization; Drinking water filtration technology; Air pollution control technology; Recycling electronic waste; Project to test digital applications in education; Golden Sun Program - building photovoltaic plants in remote areas without electricity; Special mentoring program for S&T to form start-up businesses in rural areas; National S&T Project on increasing crop productivity; Access to rural ICT in Shandong and Hunan provinces,…

[13] In 2010, at least 200 million Yuan was granted to support the departments of biology, medicine, and medical engineering at the Shenzhen Institute of Advanced Technology (SIAT) for research on cost-effective medical services. Also in 2010, the agricultural technology commercialization fund received an investment of 493 million Yuan from the central government and a counterpart matching fund of 89 million Yuan from the local government, and successfully attracted 2,836 million RMB capital from banks and private enterprises.

In 2007, China initiated the Rural Household Appliances Sales Program. This program provides 13% subsidy to rural residents to purchase products such as televisions, refrigerators, mobile phones and other home appliances[14.] Thanks to this Subsidy Program, products with inclusive innovation features have flooded the rural market, including cheap heating devices using solar energy, thereby helping low-income groups access to needed products. In 2010, there were about 3,000 companies with 3 million employees working in the solar energy industry, resulting in a total revenue of solar thermal products of about 600 million Yuan.

The Information Network Platform for Rural Areas (INPRA) program was initiated by the Ministry of Industry and Information Technology and the Ministry of Agriculture of China in 2004 with the aim of improving farmers' access to information technology is also a successful example[15.] Another typical example is the project to appoint a special S&T envoy to rural areas initiated by the MOST and the Ministry of Agriculture. The State has encouraged experts, professors, researchers, and PhDs to go to the countryside to commercialize their innovation results and build agricultural technology parks. Mobilized S&T envoys have acted as intermediaries between research institutes and businesses, thereby creating conditions for close links between research and production[16.]

In addition, the Chinese Government also plays a role in supporting technology parks and business incubators to produce and commercialize innovation results. Agricultural S&T zones have been established to promote industrialization and commercialization of innovation results in this field. These technology parks are created by combining technology and capital, to attract leading agricultural enterprises to organize farmers to participate in the production of high-value products.

Besides that, the Chinese Government has also used its public procurement rights to encourage innovative manufacturers to cover and expand the scope and scale of purchasing public services. The “first purchase” mechanism has also created incentives for the private sector to produce inclusive innovation products[17.]

b) Initiatives of universities and research institutes

Scientific experts from Chinese research institutes and universities, with their vast knowledge treasures and strong research capabilities, have also provided

[14] Of which, the central government contributes 80% of the total subsidy amount and local governments contribute the rest. Thanks to that, in 2010, 77.18 million products were sold, with a total value of 173.23 billion yuan, and refrigerators and TVs accounted for 61% of the total sales value.

[15] At the end of 2008, INPRA covered 97.35% of rural areas and had more than 40.36 million users. Despite the large initial investment of 19.5 billion yuan, the business became profitable in 2009.

[16] The special envoy project began in 1998 in Nanping City, Fujian Province and quickly spread nationwide in the early 2000s. As of the end of 2011, there were about 170,000 S&T commissioners who had benefited more than 50 million rural households.

[17] Public services that use the procurement mechanism include agricultural seeds and machinery, essential drugs and vaccines, textbooks, and cloud computing. Several inclusive innovation products have been included in the government's procurement list, such as multi-function diagnostic beds for village clinics, low-cost computers purchasing for secondary and primary schools, and providing service for multimedia teaching in rural schools.

suitable technologies for inclusive innovation activities. The low-cost medical system is considered one of the "Innovation 2020" strategies of the Chinese Academy of Sciences. More than 30 research institutes affiliated with the Chinese Academy of Sciences also coordinate with Shenzhen Institute of Advanced Technology, Suzhou Institute of Biochemical Engineering and Technology and Shanghai Institute of Advanced Research to jointly devote many resources to research and create low-cost medical equipment and services. Thanks to the indigenous medical chip developed by the Shenzhen Institute of Advanced Technology, the price of diagnostic and monitoring equipment installed in rural clinics has dropped significantly[18.]

In the agricultural sector, the massive public research system[19] has helped cover a wide field to develop new crop varieties to increase productivity for rural households. Many experiments on high-yield breeding have shown successful results and are applied by farmers. The application of advanced technologies has increased the yield of disease-free sweet potato cultivation based on tissue culture technology which has increased yields by 30-40%.

Universities and research institutes also play an important role in cooperation with businesses to promote the application of new technologies in inclusive innovation. The form of partnership can be implemented through university spin-off businesses or through joint research and technology licensing links between research institutes, universities, and businesses[20.]

During the process of participating in the inclusive innovation program, universities and research institutes also enjoy many benefits. For example, the Shenzhen Institute of Advanced Technology has created over 80 patents in low-cost medical devices and has become an important player in the medical device manufacturing industry. At the same time, the Institute also received research grants from the Natural Science Foundation of China, grants from the Ministry of Education and from the National Social Science Foundation (SSFC). In addition, the overarching inclusive innovation practice also provides the Institute with diverse educational experiences, thanks to which the Institute's Credit Ease program was also selected as a typical case in China's Chinese MBA Case Competition in the years of 2009 and 2010.

c) Initiatives of the private business sector

Despite facing limitations in market information, lack of knowledge and skills, inadequate market infrastructure and limited access to financial services, many businesses in the private sector in China is actively participating in inclusive

[18] The multi-purpose diagnostic bed is an outstanding solution to alleviate the severe shortage of medical equipment in rural areas at a cost as low as 35,000 yuan (5,500 USD), while imported equipment used in large hospitals cost up to 10 million yuan.

[19] Including 1,237 agricultural research and development institutes and 888 agricultural universities or colleges of technology.

[20] Tsinghua University established spin-off enterprise Tsinghua Solar to promote solar thermal technology for application in rural areas; Shenzhen Institute of Advanced Technology cooperates with Shenzhen Kangva Technology Company to provide suitable technology for inclusive innovation as stated above.

innovation activities. Businesses have introduced many new solutions, models, and operating principles such as: health care services, electricity production and credit provision for excluded people; Providing innovative products at reasonable prices, suitable for the affordability of low-income people (mobile phones, solar thermal systems, other devices to help improve livelihoods...).

The general framework for private sector inclusive innovation solutions includes: (i) adapting new technologies to provide affordable products; (ii) restructuring the value chain and utilize local resources to build local capacity; (iii) overcoming infrastructure barriers and other constraints; and (iv) combining the capabilities and resources of other organizations to co-create inclusive innovation solutions[21.]

d) Grassroot innovation initiatives

In China, there are many initiatives coming from people, especially the poor, with the aim at helping themselves and benefiting communities with similar needs. These initiatives span different sectors such as: agriculture, healthcare, energy, transportation, home utilities and public security. Grassroot innovators include not only farmers, students, mechanics, artisans, and retired workers, but also experts, professional researchers, and entrepreneurs. Like innovation in the formal sector, grassroot innovation also includes technological and organizational innovation. Many grassroot innovators focus on addressing the specific needs of the poor that the formal sector often ignores[22].

Grassroot innovations are often implemented by improving existing products to increase convenience. These innovations are developed by founders combining existing technologies to suit local conditions and solve specific problems. Many founders also use good concepts or features in one area to solve completely unrelated problems in another area.

In addition to collaborating to solve their own or others' problems, there are also grassroot innovation collaborations that aim to promote innovation cooperation

[21] Chinese businesses adapt new technologies to provide affordable products instead of producing high-end products like developed economies to create inclusive business models at a lower cost that are suitable for low-income people to pay. For example, MediaTek specializes in producing system-on-a-chip solutions for wireless communication, significantly cutting costs, making mobile phones low-priced and widely used in the low income market; Haier Company develops low-cost washing machines to serve rural users; Tebian Electric Apparatus company develops a small power system that can be carried by camels; Trina Solar and Goldwind companies apply inclusive business models to provide low-cost, efficient energy products to low-income groups; Credit Easy Company provides microcredit through the Internet and cooperates with local organizations to provide financial literacy programs for customers and basic accounting and business management skills for small business customers.

[22] *Examples of grassroot innovations*: 1) *Anti-theft alarm*. In 2001, a group of electricians in Dai Truong village, Bac Than district, Tianjin invented a burglar alarm device for transformers. These devices were sold on the market at very high prices and have attracted the attention of village chiefs. However, a group of electricians has developed a simple burglar alarm that costs only about 100 RMB, much cheaper than similar products sold on the market. The local government held on-site meetings in Dai Truong to introduce this innovation, and more than 20 villages in the district have used it; 2) *Pollinate onions*. Excessive use of fertilizers and pesticides has reduced the number of honeybees, so farmers in Tianjin must pollinate by hand. “Two-smell” Chinese onions will bloom for about a month, extending the time of artificial pollination and requiring more work. However, farmers in Tianjin have developed a new technique by keeping rotting material in onion fields to attract pollinating flies like bees. This technique is not only effective but also cost-effective.

with research organizations. Several grassroot innovators have contributed and supplemented official research activities. For example, the technology to produce cucumbers in greenhouses in winter without additional heating or cement-like materials invented by farmers is a breakthrough in underground waterproofing projects[23].

The government has an important role in encouraging and developing grassroot innovations: the Ministry of Agriculture and Rural Development and the MOST both provide separate budgets for programs to promote and replicate technological innovations. Formal technology dissemination channels such as agricultural extension systems also play an important role in providing many grassroot innovation products such as greenhouse technology. Since 2004, the Government has also established a category in the annual National Science and Technology Awards to encourage grassroot innovations. Along with the grassroot innovation support program (patent registration, connection with businesses and potential investors), the annual national invention exhibition organized by the China Science and Technology Association in collaboration with local authorities also awarded prizes to innovators at many levels.

The media plays an important role in popularizing grassroot innovators. CCTV's Get Rich Encyclopaedia program, focusing on introducing the successful experiences of rural entrepreneurs, has helped popularize many successful grassroot innovations. Research institutes and university students have also cooperated to popularize grassroot innovation[24].

The following Table 2 summarizes typical programs and initiatives in China related to inclusive innovation according to policy beneficiary groups[25].

Table 2. Typical policies and initiatives related to inclusive innovation in China

Policy levels	Social inclusive policy	Sectoral inclusive policy	Territorial inclusive policy
Government	- Spark program in China - IT Organization Initiative to implement Telemedicine support - Golden Sun Program - building photovoltaic plants in remote areas without electricity		

[23] Wang Heng, a farmer in northern China's Shanxi province, has developed a cement-like material that is waterproof and can harden within six seconds in water. His products have been widely used in China and introduced to many other countries such as Japan, Bangladesh, Korea, and Morocco.

[24] For example, Tianjin University of Finance and Economics (TUFE) develops mechanisms to find, document and introduce grassroot innovators, and has created an online platform to help incubate grassroot innovators, with more than 3,000 case studies and about 100 videos about grassroot innovators. In addition, students at TUFE also support grassroot innovators in marketing and applying for support from the Government and other relevant organizations.

[25] Inclusive innovation programs and initiatives are recommended by the OECD to be classified into the following 3 groups of policy beneficiaries: 1) policies for individuals belonging to socially excluded groups (referred to as is a social inclusive policy); 2) policies for businesses in traditional production sectors and fields that suffer many disadvantages and have little opportunity to have equal access to innovation activities like other businesses (referred to as sector inclusive policies) and 3) policies for individuals and businesses in regions and territories that are lagging behind, with many limitations in connectivity, poor innovation activities and weak ability to absorb innovation compared to other individuals and businesses in other more developed areas (referred to as territorial inclusive policies).

The above classification according to policy target groups comes from the analysis of causes and obstacles to inclusive innovation activities as well as aims to create conditions for policy beneficiary groups to improve their innovation capacity and easier access to inclusive innovation opportunities.

	- Access to rural ICT in Shandong and Hunan provinces	- Drinking water filtration technology; Air pollution control technology; Electronic waste recycling technology; Pilot project for digitally enabled education	- Program for appointing special advisors on S&T and establishing start-up businesses in rural areas; National S&T Project on increasing crop productivity; Rural ICT Access Project in Shandong and Hunan Provinces
University - Research Institute	- Thanh Hoa Green Leap Research Center; Shenzhen Institute of Advanced Technology, Suzhou Institute of Biochemical Engineering and Technology, Shanghai Institute of Advanced Research collaborate on research on low-cost medical services		
Enterprise	- MediaTek specializes in providing system-on-a-chip solutions for wireless communication, resulting in reduced technical barriers to manufacturing and significant cost cuts. - Haier has invented affordable washing machines to serve the needs of users in rural areas		
	- Global View Company provides online training solutions based on cloud computing; Himing Solar Company provides solar power systems throughout China; Financial services company Credit Easy provides person-to-person microcredit via the Internet;		
Public-private partnership	- GE Company's "Health Imagination" plan cooperates with local authorities to develop affordable medical equipment - Siemens SMART provides low-cost medical solutions for rural areas. - Shenzhen Kangva Technology Company cooperates with Shenzhen Institute of Advanced Technology to produce and market low-cost medical system		
Grassroot innovation			- Anti-theft alarm; Pollinate onions.

Source: Ta Doan Hai (2023), Research on policies to promote inclusive innovation and recommendations for Vietnam

3.2. Success factors and challenges for inclusive innovation in China

Although there is no official topic literally named an inclusive innovation policy, China has also achieved many successes in activities aimed at inclusive growth based on innovation. The factors leading to success in innovation for inclusive growth in China are summarized in the following five groups: (i) the

Government's commitment to addressing inequality to create a harmonious society, reducing income disparities and improving access to basic services[26]; (ii) strongly developed infrastructure and IT have created favorable conditions for inclusive innovation in underdeveloped areas[27;] (iii) The increasingly perfect national innovation system with a full range of actors has helped provide the necessary knowledge, human resources and R&D capacity to promote inclusive innovation[28;] (iv) the development of the private economic sector has created conditions for the production and dissemination of low-cost products to reach low-income customer groups[29]; (v) The low-income market is quite large and diverse, with increasing purchasing power, creating opportunities for the private economic sector and other entities to participate in inclusive innovation[30].

On the other hand, the World Bank also points out 8 groups of obstacles and challenges when China pursues an inclusive growth strategy based on inclusive innovation as shown in Table 3 below.

Table 3. Policy issues and challenges in promoting inclusive innovation in China

No	Policy issues	Challenges/barriers
1	Lack of a common and clear policy framework on	- Lack of a clear and integrated innovation strategy and policy. Programs and initiatives are independent and separate. - Financial incentives, public procurement, and other support tools to encourage inclusive innovation initiatives.

[26] Since 1986, China has initiated the Poverty Alleviation Program targeting 592 poor counties; then in 2001 it focused on more than 148,000 villages; From 2001 to 2007, the Government provided an annual average of about 28 billion RMB for poverty reduction programs. In 1998, the Chinese Government launched the "Western Development Strategy," and in 2003 the "Northeast Revitalization Plan" to invest billions of dollars in the underdeveloped Western and Northeast regions.

[27] By the end of 2009, 61.3% of villages and communes had good roads, and 97.4% of rural households had access to electricity. Most villages are provided with television, telephone, mobile network, and internet. In addition to infrastructure, the Government has established rural information stations to provide farmers with low-cost information services: as of 2011, there were 11,724 village-level information services provided by the Ministry of Industry and Information Technology (MIIT) and the MOST supported the establishment, local governments at all levels and China Telecom also established 118,000 and 180,000 rural information service stations in 2011 respectively. Thus, each district and administrative village has access to information service stations. The development of infrastructure and IT has also created favorable conditions for accessing IT-based inclusive innovation products and services.

[28] China has initiated S&T programs and used the National Natural Science Foundation as an important tool to promote basic research in various fields. Notably, businesses are allowed to deduct up to 150% of their Research and Development (R&D) expenses. The higher education system has also grown strongly from 1,054 institutions in 1995 to 2,358 institutions in 2010, of which nearly 700 higher education institutions have participated in R&D activities. Universities in China have significant enrolments in science and engineering disciplines, providing a large base for research activities. At the same time, these universities also have a strong orientation towards applied research. Therefore, over the past decade, universities in China have become a source of basic knowledge and an important bridge between science and industry. Meanwhile, businesses have actively participated in research activities, accounting for more than 70% of all these activities (up from less than 40% in 1990).

[29] It is estimated that the number of private enterprises operating in the field of S&T has increased from 7,000 in 1986 to 150,000 in 2006. Among medium and large enterprises, spending on R&D of private enterprises in 2006 accounted for only 10.5 billion RMB (equivalent to 63% of state-owned enterprises) increased to 41.3 billion RMB in 2010 surpassing state-owned enterprises. The number of domestic patent applications by private enterprises also increased significantly from 1,885 in 2006 to 8,659 in 2010.

[30] If calculated according to the criterion of 2 USD per day (according to purchasing power parity PPP), the number of low-income people in China in 2005 was 394.6 million people. This is a very large market for low-income groups. In 2005, China was the country with the second largest concentration of low-income people after India, accounting for more than 13% of all low-income people globally.

	inclusive innovation.	- Cooperation and coordination of other programs are fragmented and unstructured. - Cooperation between state agencies on STI and poverty reduction policies - China does not have a high-level national agency to manage, build, support, and monitor the implementation of inclusive innovation initiatives.
2	Limited effectiveness of government-run policies and programs	- Limited participation of other stakeholders, especially the private sector, in the design and planning process of programs and policies. - The beneficiaries, quality, and ability to pay for goods and services have not been clearly planned in the program design. - Insufficient understanding of the real needs of low-income people; The feasibility of the business model is unclear. - The government intervenes directly in the provision of products and services instead of creating a supportive environment and promoting the participation of the private sector and stakeholders, leading to a burden on the government budget. - Monitoring and evaluating the effectiveness of Government-controlled projects is weak; Monitoring and evaluation of results and impacts are limited.
3	The scope of application and sustainability of inclusive innovation initiatives of the private sector is not high	- The reach and potential for expanding inclusive innovation initiated by the private sector is limited and not clearly defined. - The financial sustainability of inclusive innovation enterprises needs to be verified.
4	The trend of universities and public research institutes giving more priority to innovations in key fields rather than inclusive innovations	- Very few universities and research institutes specialize in inclusive innovation because of their focus on innovation in key fields. - Universities and research institutes have not been encouraged to participate in inclusive innovation. Criteria for evaluating universities and research institutes also emphasize publishing in leading journals and promoting university rankings in the education system, so professors and scientists focus more on Innovation belongs to key fields to achieve many international publications. - The transfer, commercialization and implementation of some products and technologies related to inclusive innovation are still weak.
5	Legal and institutional barriers for the private sector when implementing inclusive innovation according to market mechanisms	- Many regulations restrict the private sector from participating in inclusive innovation. - Some low-cost innovations are considered of poor quality and are discouraged instead of turning them into high-quality products for low-income people. - Ordinary creative innovators are not aware of the importance of intellectual property rights and lack understanding of the legal procedures to be granted intellectual property rights. Many popular innovators cannot pay registration fees and periodic fees to maintain patents.
6	Government support for grassroot innovation is still limited	- The Government's support for grassroot innovation and programs to support popular innovators are still limited. - Lack of incentive mechanisms, policies, and institutions for promoting and spreading grassroot innovations. - The competitiveness of popular innovators with scientists from the official sector in applied projects is still low.

7	International cooperation in inclusive innovation is still limited	- Cooperation with international organizations is still limited, and the content of cooperation on inclusive innovation is still sketchy.
8	Venture capital to support small innovative businesses starting up with inclusive innovations is still rare	- Although capital for venture capital has increased rapidly in recent times, early-stage capital for innovation fields related to low-income groups is very limited[31]. - Capital support from the State and venture capital funds for small and medium-sized enterprises to develop inclusive innovation solutions is still very low.

Source: Ta Doan Hai (2023), Research on policies to promote inclusive innovation and recommendations for Vietnam

4. Inclusive innovation policy solution options in China

4.1. The goal of inclusive growth policy in China

With the top priority in the National Agenda being the goal of building a harmonious society and reducing disparities in income and access ability to services, as early as September 2010, China proposed an inclusive growth strategy to reduce poverty, narrow the income gap between rural and urban areas, and improve access to basic social services for the urban and rural poor. Next, in the 12th Five-Year Plan (2011-2015), China also set the goal of sharing development benefits with all Chinese people. In that context, whether we like it or not, inclusive innovation has become an important topic for the Chinese Government. China has clearly recognized that the innovation for inclusive growth with core factors such as: reasonable accessibility, high quality, low cost, sustainable business model and widespread dissemination play a very important role in solving the growing gap between rich and poor.

4.2. Choosing inclusive innovation policy solutions in China

Based on the results of analyzing inclusive innovation policy issues and maximizing existing strengths, the World Bank has made recommendations on policies to promote inclusive innovation in China, with the following contents: First, synchronize the system of mechanisms and policies for inclusive innovation by integrating all mechanisms and policies related to inclusive innovation; On that basis, synchronously design coordination mechanisms between inclusive innovation policies and the current policy system; Second, develop policies to create favorable conditions for businesses to implement

[31] In recent years, venture capital investment in China has grown rapidly and surpassed many OECD countries in terms of GDP. For example, in 2011, venture capital investment in China accounted for 0.171% of GDP, while the average for the top 5 OECD countries was 0.110% in 2008 and 0.042% in 2009. However, venture capital investment is only concentrated on a number of high-tech and emerging strategic industries such as: (a) information technology; (b) advanced materials and nanotechnology; (c) clean and energy-saving production technology; (d) biotechnology and life sciences for health, agriculture and renewable energy; (e) new energy. *Source: Ventral Capital Development in China 2011.*

inclusive innovation, especially simplifying intellectual property registration procedures and easing legal requirements for inclusively innovative businesses to accelerate the establishment and development of inclusive innovation enterprises; Third, form a dedicated Fund to support inclusive innovation to provide necessary resources for research activities, technology development, sustainable production and distribution of inclusive solutions, especially the ability to easy access to risk capital in the early stages of start-up for inclusive innovation initiatives; Fourth, promote the strengths of all stakeholders in implementing inclusive innovation solutions at reasonable costs, including building innovation sites/clusters to increase cooperation and access to inclusive innovation initiatives of stakeholders to benefit low-income communities; Fifth, create a mechanism to encourage public universities and research institutes to carry out inclusive innovation activities through the creation of awards and competitive funding mechanisms to support inclusive innovation startups or have a mechanism to evaluate research organizations and researchers to create motivation and encourage focus on meeting the need for inclusive innovation; Sixth, develop policies to promote inclusive innovation activities through gathering, classifying and documenting inclusive innovations, identifying grassroot innovations with potential for replication and appointing experts to support them finalize ideas and create favorable conditions for the granting of intellectual property rights and coordinate technology transfer to interested parties for inclusive innovation; Seventh, strengthen cooperation between domestic, regional and international organizations to form collaborative networks and share methods to solve common problems of low-income groups and encourage diffusion inclusive innovation projects; Eighth, organize awards for inclusive innovations such as: initiating the Grand Challenge Initiative to solve related challenges and organizing competitions and awards for excellent projects according to specific topics of importance for low-income groups nationwide.

5. Implications for Vietnam in building an inclusive innovation policy

The successes in the innovation process for inclusive growth and sustainable development along with the challenges and policy choices related to inclusive innovation in China have left many valuable lessons for developing countries. In the context that our country is actively implementing national programs on hunger eradication, poverty reduction, socio-economic development of ethnic minority and mountainous areas, and agricultural and rural sustainable development program[32],… from China's experiences, useful lessons can be drawn for Vietnam when designing an inclusive innovation policy[33] as follows:

[32] According to the announcement of the Ministry of Labor, War Invalids and Social Affairs, in 2022, if calculated according to the multidimensional poverty standard for the period 2022-2025, the national multidimensional poverty rate (including the rate of poor households and near-poor households) is 7.52%, with a total number of multidimensional poor and near-poor households of 1,972,767 households. *Source:* https://vneconomy.vn/ca-nuoc-con-hon-1-9-trieu-ho-ngheo-da-chieu.htm.

[33] To have an effective inclusive innovation policy, in addition to mastering the theory of inclusive innovation and the practice of building and implementing policies related to inclusive innovation in Vietnam, one thing, that cannot be overlooked that studying lessons and success/failure models of inclusive innovation policies learned from countries around the world, notably lessons from China. The reason why lessons from China will be useful is that:

Firstly, propagate and widely disseminate to raise awareness about inclusive innovation. Inclusive innovation is necessary to achieve sustainable growth for the goals of hunger eradication, poverty reduction, social inequality and narrowing the gap between rich and poor, so that no one is excluded or left behind.

To achieve the goal of sustainable growth, China has propagated and called for the participation of all individuals, businesses, organizations, and communities in inclusive innovation activities to promote economic activities to achieve the goal of achieving sustainable growth and minimize development gaps between regions, localities, and population classes.

During this process, China has used many new technologies in production and consumption to increase productivity, economic efficiency, improve quality of life, and improve the environment. S&T and innovation in China have aimed at both increasing the access of excluded groups to social services and reducing income inequality between social classes. Inclusive innovation has been considered the key to achieving inclusive growth and sustainable development.

Second, it is necessary to build facilities to create a favorable environment to promote inclusive innovation activities: develop and implement programs and plans to minimize inequality in social welfare for underdeveloped regions and areas aim to share the benefits of development with everyone, so that no one is left behind and move towards a society with sustainable development. In these programs and plans, attention should be paid to providing electricity infrastructure, roads, schools, and information services for businesses and farmers in remote and disadvantaged areas to create conditions and opportunities to implement inclusive innovation activities to improve agricultural efficiency and productivity, increase income for farmers and businesses participating in the market for low-income people.

Third, clearly identify the problems/challenges for inclusive innovation to have appropriate response policy solutions to help overcome the identified barriers, with attention paid to overcoming the lack of an inclusive innovation development strategy, that is specific, clear and synchronized with the development strategies of other sectors and fields of the country; promptly overcome problems that arise in harmonizing and coordinating actions between management agencies and relevant parties; Encourage the private economic sector to actively participate in inclusive innovation.

Fourth, mobilize elements in the innovation system, especially research institutes and universities, to participate in providing appropriate technological solutions for inclusive innovation, especially inclusive innovation in the health sector, and agriculture. Adding criteria for evaluating universities and research

there are many similarities between Vietnam and China. And the most prominent similarities are the similarities in the socio-economic development model under the leadership of the Communist Party, geographical proximity, and traditional customs; and the influence of learning traditions and ways of thinking based on Asian philosophy.

institutes to create motivation for scientists to participate in inclusive innovation. Initiate national competitions and awards to reward outstanding projects on specific themes serving excluded and low-income populations; Develop a funding and technical support mechanism to help grassroot innovation develop. It is necessary to create a mechanism to support businesses in minimizing the lack of information, skills, and infrastructure, helping them overcome barriers when participating in inclusive innovation activities.

Fifth, other solutions: Vietnam needs to think about integrating all types of innovation policies (both traditional innovation and inclusive innovation), in accordance with the existing institutional system to promote inclusive innovation nationwide; Consider reducing costs and periodic fees for maintaining intellectual property rights for businesses and inclusive innovation initiatives to accelerate the establishment and development of inclusive innovation enterprises; Arrange specialized resources, especially financial resources, and have appropriate mechanisms to support research and technology development activities and spread inclusive innovation solutions for the goal of sustainable development./.

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