

## SCIENTIFIC RESEARCH AND SOCIO-ECONOMIC DEVELOPMENT IN CHINA: A MODEL FOR DEVELOPING COUNTRIES

SAMINU ISMAIL, PH. D

Department of Political Science,  
Federal University Dutse,  
Jigawa State, Nigeria  
saminu770@gmail.com

### ABSTRACT

*There is no doubt that science and technology have inspired development across sectors across the globe. Science, in its broader understanding includes engineering as well as the social sciences and the humanities – plays a crucial role for all facet of development. The main objective of this research is to examine the level of China’s commitments in the development of science and technology towards its socio-economic development. With the use of the secondary source of data and descriptive method of data analysis the paper concludes that the commitment of china in the area of science and technology has immensely developed its economy that eventually leads to the general socio-economic development of its citizens which also be seen as a model for development in developing countries. Thus, the paper recommends that, developing countries have to invest hugely in the area of scientific research along-line favorable entrepreneur development schemeso as to boost their economy which willin-turn lead to the socio-economic development of their citizens.*

**Key words:** Science and technology, research, socio-economic development, developing countries, China

### Introduction

There is no doubt that science and technology has inspired development across sectors across the globe. Science is the study of knowledge which can be made into a system and usually depends on seeing and testing facts and stating general laws. Technology on the other hand, is the practical application of scientific knowledge or indentations to the solving of daily problems or facilitating tedious human activities. In its broader understanding, science, including engineering as well as the social sciences and the humanities – plays a crucial role for sustainable development. The 2030 United Nation Agenda for Sustainable Development formally adopted in September 2015 calls for action by all countries to promote science inclusive economic growth and social development while protecting the planet. It recognizes the need to mobilize science at multiple levels and across disciplines to gather or create the necessary knowledge and thus lay the foundations for practices, innovations and technologies needed to address global challenges today and in the future. (See Daniel, 2018).

Science will be one of the most critical means of development, its role, however, must not be limited to that of a tool alone. Achieving any desired developmental outcomes will require acknowledging and maximizing the contribution of science beyond being a ‘means of implementation’. Indeed, science is a driver and enabler of inclusive and people-centered sustainable development. The research in science, technology and humanity have contributed to the development of countries such as United State of America, European Countries, Japan, China and to an extent in some African countries. Through the application of scientific knowledge many countries have been able to invent equipment and machines being used in industries and even in homes. In addition to this, science and technology has helped in easing stresses brought by the movement of goods and people from one place to another by inventing easy transformational equipment like automobiles, aircrafts, among others (UNESCO, 2016).

Furthermore, research in science and technology has helped in the area of medicine. Some natural herbs converted to drugs with the aid of modern equipment and these drugs are used in our hospitals and pharmacies. Moreover, rural communities are transformed to urban settlements through science and technology. This is made possible through the availability of electricity, pipe-borne water, good road, schools, hospitals and other social amenities, which makes these places developed by an increased population. Equally, important is the fact that research in science and technology has helped in making work easier for people to do through the invention of computers and household machineries, it has also made communication faster, through the use of mobile phones, televisions, radio etc., as well as aiding so many sectors of the economy such as the advertisement sector, sports and fitness, transportation, and so on (Daniel, 2018).

**Objective of the study****The general objective:**

Is to examine the level of China's commitments in the development of science and technology towards socio-economic development of its citizens.

**Specific objectives:**

- To examine the level of China's investment in scientific research,
- To examine the China's development in the study of science and technology,
- To relate the level of its scientific development with the level of the socio-economic development among its citizens.

**Methodology**

The study is descriptive in nature, that's the major purpose of the descriptive research is description of the state of affairs as it exists at present (Kothari, 2004: 2). To this end data was gathered through various sources and methods. The study made use of secondary data sourced from internet, published books, journals as well as unpublished materials like dissertations, theses and conference papers. The analysis involves the direct use of the relevant information found in the sources of data and manipulated to describe the existing relationships between the variables under study.

**Discussions and analysis of Data**

China is the third largest country in the world in terms of area but it is the world largest on population. The country is a developing nation with an economy that is controlled politically by communist leadership. Chinese civilization began more than 5,000 years ago and the nation has played a crucial role in world history and is continuing to do so till today. China is a communist state with unicameral legislative branch of government called the National People's Congress that is made up of 2,987 members from the municipal, regional and provincial level. There is also a judicial branch comprised of the Supreme People's Court, Local People's Courts and Special People's Courts. China is divided into 23 provinces, five autonomous regions and four municipalities. National suffrage is 18 years of age and the main political party in China is the Chinese Communist Party (CCP). There are other smaller political parties that are controlled by the CCP (Briney, 2017).

China's economy has changed rapidly in recent decades. In the past, it was focused around a highly planned economic system with specialized communes and was closed to international trade and foreign relations. With the level of its commitment in the development of science and technology, however, this began to change and today China is more economically tied to the world's countries. In 2008, China was the world's second largest economy. Today, China's economy is 43% agriculture, 25% industrial and 32% service related. Agriculture consists mainly of items like rice, wheat, potatoes and tea. Industry is focused on raw mineral processing and the manufacturing of a wide variety of items (See, Briney, 2017).

**Scientific Research Development in China**

While Europe and the U.S. have traditionally led in scientific development, China in particular has emerged as a new science and technology (S&T) powerhouse. A key indicator of the rise of China in S&T is its spending on research and development (R&D). Chinese R&D investment has grown remarkably over the past two decades, with the rate of growth greatly exceeding that of the U.S. and the EU. China is now the second-largest performer in terms of R&D spending, on a country basis, and accounts for 20 percent of total world R&D expenditure. It is also increasingly prominent in industries that intensively use scientific and technological knowledge (Veugelers, 2017).

This steep improvement in S&T performance has been underpinned by significant strides in science and engineering education. In 1982, only 0.8% of Chinese ages 25–29 had attained post-secondary education. This figure rose to 3.3% in 1990, 6.7% in 2000, and 20.6% in 2010. China is now the world's number one producer of undergraduates with science and engineering degrees, delivering almost one quarter of first university degrees in science and engineering globally. Since 2007, the country has awarded more Ph.D. degrees in natural sciences and engineering than any other country globally. China's rise in science and technology is not an accident. Successive Chinese leaderships have seen S&T as integral to economic

growth and have consequently taken steps to develop the country's S&T-related infrastructure. (See Xie et al., 2014 and Veugelers, 2017).

Technological development and innovation figure prominently in the Chinese thirteenth five-year plan (2016-20). It started with the China's National Medium and Long-Term Programme for Science and Technological Development (MLP), introduced in 2006. It is an ambitious plan to transform the Chinese economy into a major center for innovation by the year 2020 and to make it the global leader in science and innovation by 2050. One of the goals of the MLP is to boost R&D expenditure to 2.5 percent of gross domestic product (GDP), a target that has largely already been reached (Veugelers, 2017).

China's growth model for science, although aspiring to be indigenous, still involves sending out its increasingly better locally trained scholars to the best institutes in the world and reaping the benefits upon their return in later stages of their careers when they have fully developed their capabilities. All this leaves a China-U.S. connection that is virtuous, mutually beneficial for both science systems, and so far, robust (Veugelers, 2017).

New data reveal that in the past three decades, China has become a major contributor to science and technology. Four factors favor China's continuing rise in science: a large population and human capital base, a labor market favoring academic meritocracy, a large Diasporas of Chinese-origin scientists, and a centralized government willing to invest in science. These factors may serve as an example to other nations, particularly Africa, in aspiring to advance their standing in science. China has experienced rapid and sustained economic growth since its economic reform began in 1978. Net of inflation, the annualized growth rate was 7.7% between 1978 and 2010 (See Xie et al., 2014 and Asian Scientist newsroom, 2017).

Chinese Ministry of Science and Technology (MoST), which acts as a gatekeeper for funding and project coordination, upgraded and consolidated the National Key Technologies R&D Program. This is the first of the five major umbrella programs in national R&D reform. The consolidated institution supersedes the 863 and 973 programs, which had previously been scattered across a variety of government agencies and state-owned enterprises (SOEs). Funding for the 13<sup>th</sup> FYP is now beginning to be rolled out in projects overseen by MoST and coordinated through hierarchical project databases and funding grants. Larger, horizontal, inter-ministerial science and technology details were rolled out throughout 2017 and 2018 (Asian Scientist newsroom, 2017).

The reform process established in 2014 is nearly complete. In 2014 key pilot projects were established and a database of centrally financed research projects was setup. Throughout 2015 and 2016 five categories of the science and technology plans were demarcated with a unified and transparent management platform established. In 2017, the clean-up and abolition of the old funding channels is being enacted to allow the full operability of the funds. By simplifying the new R&D funding into five sections, the policy coordination aims to integrate project application and resource allocation and to upgrade industry chains and financing channels for technology innovation. This is while allowing markets to play their role and limiting governmental agencies from micromanaging projects (Asian Scientist newsroom, 2017).

The wide-ranging R&D bureaucratic architecture, which includes MoST along with a wealth of other ministries in the science and technology industrial complex, is to be consolidated from the current, fragmented funding channels into a unified inter-agency platform. This shift in R&D management is hoped to enable stronger oversight, promote efficiency and reduce micro-management from the Centre and wasteful investment by the localities. Since 2014, the Ministry of Finance has also been channeling funding for industrial upgrading away from local government fiscal spending that can't be audited and into more transparent and centrally coordinated industrial development investment funds. By early 2017 there were nearly 1000 individual funds collectively worth US\$500 billion (Asian Scientist newsroom, 2017).

These funding mechanisms will intersect with other centrally coordinated industrial policy developments as science-technology reform for national innovation is integrated into China's wider industrial infrastructure. China's State Council has said advancements in science and technology has led to socio-economic development. SOEs—the backbone of China's science-technology industry—will be mandated to spend 1.5 percent of business revenue on R&D. The proliferation of five-year plans into horizontal sectors

and vertical tiers of government is quite natural. But the speed at which the industrial technology plans have been formed and published is indicative of advanced planning. Trade policy in comparison is still struggling to publish its 13<sup>th</sup> FYP on international capacity cooperation ten months on from its announcement (Asian Scientist newsroom, 2017).

### **Scientific research and socio-economic development in China**

Since China began to open up and reform its economy in 1978, GDP growth has averaged almost 10 percent a year, and more than 800 million people have been lifted out of poverty. There have also been significant improvements in access to health, education, and other services over the same period (The World Bank in China, 2022). China is now an upper-middle-income country. It will be important going forward that poverty alleviation efforts increasingly shift to address the vulnerabilities faced by the large number of people still considered poor by the standards of middle-income countries, including those living in urban areas (The World Bank in China, 2022).

Given its size, China is central to important regional and global development issues. China is the largest emitter of greenhouse gases, with per capita emissions now surpassing those of the European Union, although slightly below the OECD average and well below the United States, and its air and water pollution affects other countries. Global environmental problems cannot be solved without China's engagement. China's growing economy is also an important source of global demand, and its economic rebalancing will create new opportunities for manufacturing exporters but may reduce demand for commodities over the medium-term (The World Bank in China, 2022).

According to Ramamurti and Hillemann, (2018) these factors together with China's political 'heft' and a range of policy levers seems to have been crucial in providing Chinese enterprises with a series of 'state created advantages' unavailable to leading competitors from other countries. In advancing research on China, the papers included in Issue A help with refining our understanding of the forces that have been driving China's social-economic, political, and technological developments, addressing the related issues, thus, advancing the social economic literature within the China context (Wang and Giovanis, 2021)

China has already made three critical achievements. First, it has drastically reduced the rural poor population and brought the poverty headcount ratio to 0.6 percent. Not only have people's living standards improved but also per capita disposable income has reached 30,733 yuan (\$4,200). Also, the urban population now accounts for about 60 percent of the total (Ladjebal, 2020).

And third, China has more or less stabilized its financial sector, and promotes higher-level opening-up and attract more foreign investments, it is further reducing taxes and fees, and setting up new free trade zones (Ladjebal, 2020). Followed the precepts of modern economics, China shifted its economy toward markets, joined the global economy, expanded higher education and industrialized via low wage manufacturing. However, the country went beyond the standard path of development in one important way. It invested heavily in science and engineering to jump from bit player to major contributor in global scientific activities. In the modern knowledge economy where, scientific knowledge is arguably "the one ring that rules them all," 2 China's new comparative advantage in the production of scientific and engineering knowledge will make it a major driver of the division of labor and trade among countries and of the direction of research and of technological and economic development worldwide (Xie and Freeman, 2019).

In 1978, after years of state control of all productive assets, the government of China embarked on a major program of economic reform. In an effort to awaken a dormant economic giant, it encouraged the formation of rural enterprises and private businesses, liberalized foreign trade and investment, relaxed state control over some prices, and invested in industrial production and the education of its workforce. By nearly all accounts, the strategy has worked spectacularly (Huand Khan,1997).

### **Summary**

The paper examines the relationship between the development in science and technology, and the socio-economic development in China. A key indicator of China's rise in science and technology is its spending on research and development. Its investment in the area of research and development has grown remarkably over decades with the rate of growth greatly exceeding that of the U.S. and the EU (The World Bank in China, 2022). It is increasingly prominent in industries that intensively use scientific and technological knowledge. Development that coincides with its economic reform favors poverty alleviation efforts that increasingly shift to address the vulnerabilities faced by the large number of people still

considered poor by the standards of middle-income countries. With this development therefore, the growth of its growth domestic products (GDP) has now averaged almost 10 percent a year, and more than 800 million people have been lifted out of poverty. There have also been significant improvements in access to health, education, and other services over years that developed the general socio-economic development among its citizens.

### Recommendations

- Developing countries have to imitate China by investing hugely in science and technological research,
- They have to boost the scientific and technological base studies in their colleges and universities,
- They have to link the scientific findings to the industrial development so as to boost outputs and develop their economy,
- They have to establish a favorable entrepreneur scheme that will harness the scientific knowledge into the individual's daily activities which will boost their level of incomes.

### References

- Asian Scientist Newsroom (2017) *How can China afford its science and technology*: Asian Scientist. [www.http.google](http://www.http.google) search (Accessed, 13<sup>th</sup> Feb, 2018).
- Brincy, A (2007) *the Geography and Modern History of China*: through Co. [www.http.google](http://www.http.google) search (Accessed, 10<sup>th</sup> Feb, 2018).
- Daniel, M (2008) *Science and technology in National development*: Street directory. [www.http.google](http://www.http.google) search (Accessed, 13<sup>th</sup> Feb, 2018)
- Hu and Khan (1997) *Why Is China Growing So Fast?:* International Monetary Fund, June, [www.http.google](http://www.http.google) search (Accessed, 7<sup>th</sup> Feb, 2018).
- Jeenah, M and Pouris (2008) *South African Research in the context of Africa and globally*: South African Journal of science 104, Sept. [www.http.google](http://www.http.google) search (Accessed, 8<sup>th</sup> Feb, 2018).
- Kothari, C.R. (2004) *Research methodology, methods and techniques*: New Delhi; New age international (p) limited publishers.
- Ladjevac, I (2020) China focuses on socioeconomic development: China Daily, [www.http.google](http://www.http.google) search (Accessed, 9<sup>th</sup> September, 2021).
- Maris, H.C and Pienaar (2010) *Evolution of south African Science, Technology, and innovation system 1994-2010: An exploration*; African Journal of science, Technology, innovation and development, vol. 2 no.3 pp 82-109. [www.http.google](http://www.http.google) search (Accessed, 8<sup>th</sup> Feb, 2018)
- Moagi, D. (2002) *South Africa National Research and development: the government of the republic of South Africa*. [www.http.google](http://www.http.google) search (Accessed, 17<sup>th</sup> Feb, 2018).
- Scholes et all (2008) *science council in south Africa*: South Africa Journal of science, Nov/Dec. [www.http.google](http://www.http.google) search (Accessed, 17<sup>th</sup> Feb, 2018)
- The Success Project, (2013) *Supporting the EU access to South African research and innovations program*: The Success program FPT, theme Inco [www.http.google](http://www.http.google) search (Accessed, 8<sup>th</sup> Feb, 2018).
- The World Bank In China (2022) Apr 12, [www.http.google](http://www.http.google) search (Accessed, 18<sup>th</sup> Dec, 2022).
- Van Zyl, W. (2016) *How the funding of science, research in south Africa can be overhauled*: South African Journal of Science 104, Sept.
- Veuglers, R (2007) *China is the world's new Science and Technology*: Power House; innovation and competition policy. [www.http.google](http://www.http.google) search (Accessed, 10<sup>th</sup> Feb, 2018).
- Wang and Giovanis, (2021) *China Special Issue, an Introduction: Economic Growth, Social Policy, and Technological Development*, Forum for Social Economics, vol. 50, www. tandonline(Accessed, 11<sup>th</sup> June, 2022).
- Xie and Freeman (2019) *Bigger Than You Thought: China's Contribution to Scientific Publications and Its Impact on the Global Economy*; Institute of World Economics and Politics, Chinese Academy of Social Science, China & World Economy / 1–27 Vol. 27, No. 1, [www.http.google](http://www.http.google) search (Accessed, 17<sup>th</sup> Feb, 2022).
- Xie, Y. et all (2014) *China's rise as a major contribution to science and technology*: [www.http.google](http://www.http.google) search (Accessed, 17<sup>th</sup> Feb, 2018).