Study of economic growth and development china

Economics

Introduction:

Economists have during recent time associated economic growth to research and development ability of a country. One of such economic models is called the endogenous growth model. According to the endogenous growth model, research and development is a key driver of technological innovations using human resources capital and the existing knowledge (Romer, 1986). This theory goes on to state that innovation is then used to produce goods which will contribute to the permanent increase in the growth rate of output. Innovations that are endogenously created are essential to a sustainable economic growth. Research & Development therefore can be regarded as an engine for the creation newtechnologyand goods.

China has a long history of research and development. The ancient China is celebrated for having invented paper, printing, compass and gun powder. China has also made great invention in the agricultural sector as well as in the astronomy (Sevin 1982). From 1946 to 1970, China pursued a socialist agenda with government playing the central role of coordinating all state affairs. Even though China was considered as a low income country during this period, it invested a lot into Research and Development motivated in order to become a world military power. Elite research institutes such as the Chinese Academy of Sciences were created to support the research and development and China rapid progress in nuclear technology, space technology, and genetic engineering in the 1960s and 1970 testifies to the partial success of this system. However as the Soviet Union was suddenly divided in the 1960, this advancement could not be sustained because China was then dependent on the importation of Technology from its main ally the

Soviet Union. Beginning from the period of Chinese economic reform in 1979, Research and Development in China experienced two transitions: first, from plan to market economy as it moves away from a centrally directed innovation system, secondly, from low income developing country toward Organisation for Economic Co-operation and Development (OECD) industrialised country status as it intensifies its innovation effort and more effectively deploys the ensuing technological gains. According to the comparative measures of R&D intensity among countries of OEC from 1991 to 2003, China's R&D intensity rose to 1. 4 percent.

Beginning from 1980 to 1990, the central government of China in its bid to catch up with other developed countries decided to formulate and financesscience and technologyprogramme throughout the countries. Programmes such as the 863 project and the 973 project were designed to promote science and technology capabilities and to catch up with the growing technological and innovation gap between China and the West. Other programmes such as the Torch programme were designed to support local high –tech industries by providing direct government grant and tax incentives to industries. This essay focuses on the Chinese National R&D (863) programme. The objective there is to critically examine the programme, evaluate its output and impact and provide recommendation for its future directions (Naughton, 2007).

National High-Tech R&D (863) Programme in Brief

The National High-Tech Research and Development Programme also known as the 863 programme came into being on the 3rd March 1986, when four top China scientists addressed a private letter to Deng Xiaoping, the then

Leader of the China calling for the establishment of an Elite project devoted to technology that would make china the “ xin jinshu geming” the new technological revolution. Deng Xiaoping agreed and approved the proposal and directed that action must be taking immediately to implement the programme. The project was then codenamed 863 programme for the year and the month of its birth.

The 863 Programme has set as objective to provide funding for technological research and innovation which were of a strategic importance to the economic and social development of China. It was expected that the programme will enable China achieve a technological “ leap frog” especially in areas were China already enjoys a relative advantages and support the implementation of the third phase of china modernisation process. In recent years, the programme has been extended to include the development of key technologies, in agriculture, biology, environmental protection, renewable energy and information technology.

Policy Context and Implementation

The programme 863 can be described as part of the general reform efforts that begun in 1979. It was important to move the country away from the socialist approach which was more focused in investing in military research which did help improve the Chinese people wellbeing. The Chinese government also believed that a reform of the economy was important as it will enable a rapid economic growth, improvement on technological innovation and fast infrastructure development that will improve the quality of life of Chinese people.

The 863 programme was constituted of an emerging China’s high-technology sector, which includes a number of high level government agencies, state-run research institutes, public and a growing private R&D investment funds. The programme could be described as an attempt of the government’s openness policy adopted toward international trade and foreign investment by providing investment attraction to foreign investors through tax incentives and co-investment in research. The project came to being at a time the government needed to find alasting solutionto its energy needs which became high as the volume of industries and the number of imported cars have increase dramatically. According to the New Yorker, by 2001, more than two thousand new cars were bought in China everyday and millions of barrels were imported from outside and depended of its coals to generate more eighty percent of its energy. This phenomenon was rendering China very polluted and the impact ofclimate changecould undermine China’s future stability. It was therefore for China to develop new technology to find new solution to its energy andpollutionmanagement. The central government wanted to focus on the development renewable energy and as a result made available direct significant public funding to research, product development and application of technologies in the renewable sector. The Ministry of Science and Technology is the lead body in charge of developing science and technology strategy, policy and coordinating other government agencies that were involved in the implementation of the project. Other institutions such as the Chinese Academy of science, the Natural foundation Committee and the Academy of Engineering were also playing important roles in the allocation of funding to research institutes.

Funding and Impact

Data from the Ministry of Science and Technology reveals a continuing growth in the Chinese Expenditure on Research and Development. In 1996 the gross domestic expenditure on R&D was 404 million Yuan and by 2006 the figure has increased to 3003 million Yuan. China currently spends almost 1. 5 percent of it of its GDP on research and Development. China's expenditure on R&D can be regarded as high considering the fact that the living standard of living is still low. By comparison the level of expenditure among OECD countries ranges between 2-3 percent. China is the only low and middle country that depicts such intensity on Research and Development expenditure (UNDP 2001). The government of China is the principal provider of funds for the realisation of the programme. Data from figure 2 shows that government funding is around seventy percent of the total fund that the programme attracted in 2006. Other sectors such the Businesses and Foreign Direct Investment also contribute to funding R&D.

Figure 1. Gross Domestic Expenditure on R&D, 1996-2006

Source: Ministry of Science and Technology 2007

Figure 2: GERD by source of funds and sector performance

Source: MOST 2007

Even though it is believed that the 863 programme has immensely contributed to the China's recent technological and industrial development an examination of the impact is required to justify the large amount of fund pumped in to the programme. The 863 programme is heavily dependent on

government fund. At the beginning of every year the commission in charge of award of grant set it objectives and calls for bid. The government intention is just to fulfil its catch up agenda with the west. Researchers and research institutes that are involved in the programme are therefore under indirect pressure to deliver the set objectives. As a result Research and Development is often riddled with plagiarism, falsification of data and conflict of interest. In 2004, the popular Chinese researcher from Shanghai Jiao tang University, Chen Jin was involved in a fakery scandal after having received more than ten million dollar in grant to produce a Chinese microchip to rival the American Intel. The situation is a rampant one among Chinese academics and researchers and the reason is that because it is public fund that is involved many researchers are afraid of taking risk sincefailuremay be expensive to them and to the government as this may mean waste of fund among public opinions.

According to information from the Ministry of Science and Technology, the 863 programme was a successful project as it helps China invent new technology such as the world First man –loading HTS Maglev, the Third Generation Intelligent Robot that can move freely and avoid barriers and able to talk with human within a certain distance and the Atmosphere and Environmental Monitoring Laser just to mention few. Considering the amount ofmoneythe Chinese government spend on Research and Development it is not encouraging to say that China high tech export is highly dominated by foreign investment. According to report from OECD, in 2006, China surpassed the European Union, the US and Japan to become the world largest exporter of high-tech. This is mainly due to the relocation of

production capacities of multinational enterprises into China. The China technological advancement has little to do with the indigenous High Tech market. Most of the firms producing High Tech goods in China are mostly foreign companies; China only contributes in labour term (Xing, 2010).

The 863 programme in its conception cannot be said to be a programme which has been designed to promote R&D in China. The central government plan was to improve the image of China and it is purely the continuity of the socialist agenda. The only change is that, instead of developing military capabilities, the Deng Xiaoping administration decided to focus on economic catch up. All the projects that were executed under the programme cannot be described as things that will contribute to long term economic growth of China. In the infrastructural and construction area, it is a fact that that the programme has helped China to achieve a historical record in road, railways and airline development. Between 2000 and 2005, the road length in China has increased from 250. 700 km to about 1, 930, 500 km. Also the Railways have experienced a rapid development. China now has double tracked rails of 25, 000km and electrified rail of 20, 000 km. The civil airline has also been developed and today China has become world second largest air transporter after the United States (Liang Chuan, 2008). Some may argue that China needs all these infrastructural development to elevate its status to a developed country. There is even a Chinese old saying which says that “ If you want to be rich, you must first build road”. But the problem is all these constructions are heavily dependent on public fund and no other country spend so much on infrastructure as China does. According to one study it is estimated that China will need to spend around $132 billion ever year from

2006 to 2010 to maintain these constructions. Moreover the central government does not take into account the social cost of all these development projects for the common Chinese people in terms of lost of land and environmental problems. The speed at which these projects are executed also poses a problem of quality and standard in the construction and engineering process. In October 1999, the $52 million 0ne half mile-long Zhaona Mountain bridge which was built over the young river in Ningbo started to has sways and shack a month before its opening date and inspectors discovered cracks caused by engineering and design flaws. So also in the month January of same year 1999, two bridges collapsed in two different places killing 47 people and injuring more than 30 others (Hays 2008).

Another core problem with the 863 programme was the incentive packages the central government made available to motivate researchers and R&D firms. It is believed that the central government support to R&D through the 863 programme has contributed to the rapid rise of China in the patent applications. Data for figure 3 from the Ministry of Science and Technology shows that the total domestic patent applications increased from 383. 157 to 470, 342 between 2005 and 2006. The design applications increased from 151, 587 to 188, 027 within the same year. This tremendous achievement can on the one side be attributed to the zeal andhard workof Chinese researchers but on the hand it can be attributed to the incentives made available by the central government.

Figure 3 Patent application filed and patents granted by SIPO

Source: Ministry of Science and Technology, 2007

The 863 programme put in place incentive packages ranging from tax reduction to several concessions. In a paper published the Economist title “ Innovation in China: Patents yes ideas maybe” it was stated that “ Professors who do are more likely to win tenure. Workers and students who file patents are more likely to earn a hukou (resident permit) to live in a desirable city. For some patents government pays cash bonuses for others it covers the substantial cost of filling. Corporate income tax can be cut down from 25% to 15% for firms that file many patents. They are also more likely to win lucrative government contracts. One could say the patents applications filed did not mean so much to the applicants compared to the gains and interest the application may yield for them. Therefore the quality and originality, patents designs, and inventions were questionable.

Closely link to this argument is that fact the 863 programme did not promote theculture of innovation among Chinese researchers and enterprises. The Ministry of Science and Technology which is the principal government agency coordinating the 863 programme stated that one of the key objectives of the programme was to strengthen the innovation capabilities of Chinese researchers and enterprises so that they can become technical bodies that will support the national aspiration of China to achieve socio-economic development. The programme supported some innovative ideas such as the development of an Intelligent Robot, the Coal-fired MHD Power Generation and the Experimental Fast Reactor. Otherwise, most realisations under the 863 programme were heavily dependent on importation of technologies. The programme was following the international high

technological development but did not focus on the development of local indigenous technology (Chunliang, 2008).

Conclusion

The 863 programme has enabled the Chinese government to achieve a considerable economic and industrial advancement. In order to consolidate all these achievement is important that the 863 programme be reformed to rather focus its attentions on promoting indigenous innovative research and development activities which can turn China into technological advanced country. Incentives and motivational elements in the programme for researchers and private investors should also be reviewed as this may put local investors at a competitive advantage over foreign investors and deter them from investing into R&D in China. Finally Chinese Government has to enforce the weak intellectual property right regime in existence at the moment.

References

ROMER, P. (2005) " Increasing Returns and Long-run Growth" Journal of Political Economy, 94 (5): 1002-1037

SAMINI, J. A & ALERASOUL, S. M. (2009) " R&D and Economic Growth: New Evidence from Some Developing Countries" Australian Journal of Basic Applied Sciences, 3(4): 3464-3469

HU. A G. & Jefferson, G. H. (2008) " Science and Technology in China" China's Great Economic Transformation. Ed. L . Brandt and T. Rawski, New York City, Cambridge University Press

NAUGHTON, B. (2007) “ The Chinese Economic: Transition and Growth, Cambridge, MA: MIT Press

PENTAS, P. (2005) “ Natioanl High-Tech Research and Development Program 863: Introduction, Objective and Organisation [Online] http://www. ppentas. com/thesis/National_RD_Programm_863. pdf, Accessed on the 17/05/2011

ONOS, E. (2009) “ Green Giant: Beijing’s Crash Program for Clean Energy” The New Yorker [Online] http://www. newyorker. com/reporting/2009/12/21/091221fa_fact_osnos, Accessed on the 17/05/2011

XING, Y. (2010) “ Chinas High-Tech Exports Myth and Reality” EAI Background Brief N. 506 [Online] http://www. eai. nus. edu. sg/BB506. pdf, Accessed on the17/05/2011