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Enhancing Science And Technology By Decentralizing Downward Management Style

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ABSTRACT
The aim of this paper is to understand and review the performance of the Science and Technology in China by decentralizing the downward management style. On the basis of different studies show that China investing more in Research and Development (R&D) investment and in Science and Technology (S&T) sector that is a great indication for the betterment of economy. But still the results of these investments are not fruitful and also don't contribute up to the expectations, and to identify the problem on the basis of literature that is downward management style. At the end enlist some suggestions to make these investments more productive

Key Words: Science and Technology(S&T), Research and Development (R&D), Downward Management, Policy, Investment, Economy

INTRODUCTION

Investment in research and development (R&D) is the major component of growing economies. It is taken as the important tool for maintaining a sustainable growth in terms of increased GDP in the economy of a country. R&D also leverages greater opportunities for research and innovative activities to be carried out (Khan, 2015; Kuo & Yang, 2008). With this, China is also considering the notion of investing more in research and development for gaining economic advantages. That is, China is spending 2.046% of the total GDP in R&D as of 2014 (OECD).

But the major reason of growth in R&D China has been found to be in the field of S&T. Pertinent literature shows that China's major S&T research areas are life sciences, environmental sciences, engineering and physical and informational sciences (Kostoff, 2008). Which stimulates that investment in science and technology (S&T) is significantly contributing to the success of R&D in China.

According to Ministry of Education (MOE), the higher education systems trend is changing its forms and components since 1980s. And in these years China has marked a total of 49405 doctors out of 65785 students enrolled for the year 2014 and this enrollment figure is expected to grow to 139,957 only for the doctorate's program in the year 2015 (MOE, 2014) . This implies the expansion of the domain of S&T in China.

With this, the management of the S&T domain is backed by three concepts in China. First is the developmental concept which states that the S&T contributes to the economic development of China. Next is the scientific concept, which relates to the innovativeness in the developmental

concept of S&T. And finally, the downward management concept, which states that the policy making on the S&T developed through scientism is done specifically by the top management, which in the case of China is the government, implying that private sector participation in S&T policy-making is rare. S&T in China is governed on the basis of these three concepts but the society is still not well acceptable towards the concept of innovativeness (Arnaldi et al., 2015).

On the basis of these aspects, China is also found to have its own National System of Innovation (NSI) which resides on technological innovative system, containing the collaborated efforts of industries, academics and research centers. Knowledge innovative system incorporates the institutional based knowledge. While, science and technology innovative systems contains the defensive integrations of research based knowledge. This NSI system of China is also linked with the concept of globalization and global society (H. Wang & Hong, 2012).

On the contrary, according to the policymakers, incremental importance of innovation in research area and increased acceptance of downward management system might delay the development process of S&T in China. The success of science and technology in China is being restricted by the dual nature of the management systems. That is, the bureaucratic public and the democratic private sector. China follows a downward management system, where government is in charge of making the decisions for the betterment of the economic state (Arnaldi et al., 2015).

Therefore, the purpose of this research paper is to explore whether downward management system pays-off well to the Chinese S&T domain. Or an alternative approach should be followed by China in order to gain robust success.

LITERATURE REVIEW

From the beginning of 1980's reforms, China gained access to technology through international joint ventures and for making the collaboration successful Chinese government made education an economic necessity. Since then, a wide variety of disciplines have been offered to attract maximum people to strengthen the R&D in China (Haour & Jolly, 2014).

As the statistics of Ministry of Education shows an upward trend in S&T in China, Wanbing (2013) highlighted reasons for this increment as improved infrastructure, enrollment of students, policies developed by the government, internationalization for discriminating a traditional university from a modern one and multi-disciplinary programs in universities. With this the management of Chinese higher education has shifted from being highly centralized to decentralization. That is, in the last two decades only 39 universities remained under the spell of MOE of China, implying that the universities have also shifted their mindset from being just indicator-centric to impact-centric (Wanbing, 2013).

From the year 1978 till 2013, China has mark rapid expansion in the domain of science due to increased number of researchers attached with greater number of research work acceptance internationally and increase in interest in China due to its rising 'status' around the globe(Liu, Hu, Tang, & Wang, 2015).

As the importance of science, technology and innovation are the key components to sustainable growth of an economy. As before, science was considered as pure scientific in nature but now the new 'conceptualization' has found science in mutual relationship with the social aspects. That is why the new trends of science, technology and innovation are being co-produced with the society in order to capture the best present situation (Forsberg et al., 2015).

That is why, China also invested heavily in S&T domain of social sciences to develop effective policies at national and international level. As in parallel to natural sciences, the study of social sciences allows exploration of the behavior of people in a society. It also contributes to the economical and social development of the country because of the deeper insights gained through increased interactions. And the advancement in S&T is seen due to the hard efforts of researchers/scientists, who explored the truth in countless areas of knowledge (S. W. Guo, 2014).

According to Guadix, Carrillo-Castrillo, Onieva, and Navascués (2016) China has been keen in building S&T parks to promote research, development and innovation (RNI). The RNI together contributes to the well being o f the economy, culture and society if backed by private and public organizations. Intimating that appropriate investment by the public sector in S&T parks might ensure greater innovative collaboration between research centers and universities.

Innovation however, is a gradual, time taking and an interactive process but is basically based upon the notion of knowledge exchange. Innovation relies on technological, regional and country wise changes therefore; it is adopted by policy makers to single out inadequacies. Further, governments also play a critical part in generating and distributing the created knowledge through public research centers and they also supports the entities who are involved in scientific, technological and innovative activities (Padilla-Pérez & Gaudin, 2014).

With this, Lundvall and Borrás (2005) suggested that the nature of S&T through innovation is twofold. That is, science and technology policies are designed for developing knowledge about science and technology specifically, from private and public research centers, labs and prominent sectors. While innovation based policies are dependent on promoting innovative processes and its smooth dissemination in respective field.

But on the other hand, Wan, Williamson, and Yin (2015) stated that China is found in the midst of disruptive innovation as well. Disruptive innovative measures are adopted by emerging economies because of the opportunities of changing demographics, geographical location of markets and technology in an economy. And Chinese economy provides a fertile ground for implementing disruptive innovation successfully due to increased customers, competitors and business units. Some low key issues which are hindering the success of China are grasping the perception of customers, establishing human resource and creating new brands (Gadiesh, Paola, Caruso, & Leung, 2007). Furthermore, a geographical and governmental imbalance of innovation capacities exists in China, which is causing the difference in the innovative activities adopted by several regions of China.

(Nichols, 2008) claimed that China's ideology is not to the point to economic development. The freedom to innovate is constrained in China which is actually a major obstacle to discovery. And innovation is related to openness which is equally required with technical advancement for economic growth.

Therefore, Zhang and Licheng (2011), Gadiesh et al. (2007) and Q. Wang and Fan (2011) suggested that the growth in S&T contributes to the economic growth of China and found that more investment in technical, scientific and R&D system increases the capability to innovate which directly relates to the economic growth of the country.

But Ljungwall and Tingvall (2015) stated that China's spending in R&D is still not sufficient for the public and private sectors delineating that the spending is not contributing to the economic growth of the country ultimately. And the only way to upscale this contribution level is to

invest more in the public sector by increasing the level of education and making the public policies transparent. This way China might be able to capture the status of being an education based economic country.

D. Guo, Guo, and Jiang (2016) investigated the governing pattern of the government in R&D programs in China and found that the centralized system of governing R&D is restricting this domain to grow beyond its actual capacity. However, government supports the innovative progress in China and is also accelerating funding to support R&D activities but the pattern of doing so is not being fruitful.

DISCUSSION

On the basis of different literature it's cleared that Chinese government investing huge amount of money in R&D for the betterment of economy and want to become innovative driven economy. From the literature its very clear that China maintained a sustainable investment rate in R&D even in the time of recession when developed nations were also reduced the investment rate but China maintained a sustained rate in R&D investment that is increasing with time because Chinese government wants their country to become more innovative and enhance technology in every sector that is very appreciable step by the government. Chinese universities also graduating many scholars, engineers, doctors and other professional degree holders from university that is also a sign of betterment in education that directly impacts on science and technology of country and help the country to become more innovative driven. Other thing is that many private sector companies are increasing in China that also helps to innovative driven economy. On the basis of literature different authors pointed out that these factors do not contributing enough in the success of innovative driven economy. Still this R&D investment in Science and Technology is not appropriately using in the field of research. Authors found some hinders in creating innovative products and new technology, that is of allocating funds of R&D, decision making, policies and control by the top management are not as per expectations. Authors also suggested that this management style is not efficient in innovation it takes so much time for decision making and allocating resources that is slow and problematic for innovation. It is also suggested that provide freedom to make policies and provide control rights to down management that takes less time in decision making. Provide funds and involve the private sectors in these competitions of Science and technology. Use the graduate students as human resources in S&T by providing them freedom in the applied research to encourage the innovation especially in the field of science and technology sector, it's clear that R&D investment is better sign for advancement of economy through science and technology but also need some other measures to give authorities to down management for getting expected results from these investments in R&D.

CONCLUSION

On the basis of this study it is concluded that China invested a lot in R&D for gaining the economic benefit through Science and Technology and becoming the innovation driven economy. Their investment is greater than as compare to other countries and showed the great sustainability in the investment of R&D in recent years but this investment is not sufficient without proper measurements like to decentralized downward management means loosen the control by the higher authorities and provide powers to low level management to take decisions and encourage innovation environment. Many scholars, engineers and doctors are graduating from universities every year but their role in innovation is less just because of the liberty and resources providing to these fresh researchers. For making their R&D investment more efficient higher authorities need to focus on decentralizing downward management.

SUGGESTION AND RECOMMENDATIONS

Based on the pertinent literature few suggestions and recommendations are as follows:

- Universities built on the premise of research should contribute to the science and technology problem, progress, social development, cultural prosperity, economic construction and national security. Shortly the research universities must improve the 'capability of serving the society' as a whole (Wanbing, 2013).
- China is investing in the field of social sciences but the outcome is not significant enough. Therefore, that China has to make considerable efforts in the field of social sciences specifically business, economics and general social sciences increased investment in social sciences will ensures maximum interaction in the context of modernization and globalization, for which China is striving hard for (Liu et al., 2015).
- China is a non-English speaking country; therefore, increased collaboration with English proficient countries may reduce the barriers and make China more adaptable to the western R&D programs and processes.
- Furthermore, China has to follow the notion of decentralization or the concept of co-creation in order to allow the private sector to indulge in decision making at an equal pace with the government. This will allow the mutual collaborations between public and private sector. And public sector being more empathetic towards the procedures being done for S&T in R&D by the private sector of China.
- The decentralized governance may ease the information issues and motivate local governments to exert more effort in project selection and ex-post monitoring activities, thus improving the effects of government R&D programs on the economy (D. Guo et al., 2016).

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