

# The systemic aspect of innovation economics essay



The concept of systemic innovation was developed by Christopher Freeman and the IKE-group in the early eighties, in a collaborative work which helped to shape the earliest versions of the theory (Freeman 1982 and Lundvall 1985)<sup>1</sup>. The inspiration they had may be found in the works of earlier economists and scholars before their time. The earliest starting point would be Adam Smith (1776) and his theory on the division of labor, and among the later scholars, were Pareto, Parvus, and the Dutch Marxist, van Geldern (Barr, 1979)<sup>2</sup>. In particular, the theory of growth through technical innovation was advanced by Joseph Schumpeter (1939), who suggested that ' Without innovations, no entrepreneurs; without entrepreneurial achievement, no capitalist returns and no capitalist propulsion' (Schumpeter, 1939)<sup>3</sup>. It is ' the ability and initiative of entrepreneurs, drawing upon the discoveries of scientists and inventors, create entirely new opportunities for investment, growth and employment. The profits made from these innovations are then the decisive impulse for new surges of growth, acting as signal to swarms of imitators.' (Schumpeter, 1939 cited by Freeman, 1982)<sup>4</sup>

Christopher Freeman's books on lessons from Japan (Freeman, 1987)<sup>5</sup> and Japan's National Innovative Systems (Freeman 1988)<sup>6</sup> further helped to widely diffuse the concept. It became evident that formal R&D helped to increase the successfulness of innovation through diffusion (Freeman 1995)<sup>7</sup>, alongside various influences on the processes of technical change at the firm and industry level (Carter and Williams, 1957; Jewkes et al., 1958; Mansfield, 1971; Nelson, 1962)<sup>8</sup>.

## **Systemic aspect of innovation**

Based on Christopher Freeman's research of the Japanese post-war industrial and innovative performance, systemic innovation was defined as 'the network of institutions in public and private sectors whose activities and interactions initiate, import, modify and diffuse new technologies.' (Freeman, 1987) and emphasizes the interaction and network aspects between institutions (Miozzo and Walsh, 2006)<sup>9</sup> Freeman's analysis focuses on training and education, stressed discretionary decision-making, and argued that those factors, including a combination of public policies and corporate governance shape the speed and flexibility of innovation. (Freeman, 1987, cited by Smith, 2000)<sup>10</sup> Lundvall takes a different approach, and see systemic innovation in terms technological interdependence among different industries, as a result of interactions between suppliers and users of capital and goods in various areas of trade specialization. When engaged in interactive learning, these actors create multiple clusters of technological capability which, as a whole, defines the various components of national systems. (Lundvall, 1988, cited by Smith, 2000)<sup>10</sup> Patel and Pavitt defined systemic innovation as 'The national institutions, their incentive structures and their competencies that determine the rate and direction of technological learning in a country' (Patel and Pavitt, 1994)<sup>11</sup> In comparison, Fischer argues that subnational scale is a more appropriate and important mode of analysis. Factors include localized input-output relations between actors, knowledge spillover effects, and their untraded interdependencies. (Fischer, 2000)<sup>12</sup> Furthermore, the importance of systemic aspects of innovation and national systems depended on innovation with various

systems of forces of production, institutions and environments. (Porter, 1990)<sup>13</sup>

In whole, the system of innovation can be summarized as being made up of the interactions of five sectors under four environments, encompassing the global, industrial, domestic support, education, and the financial sector. These environments include the government and policies, market and technology, the labor market, and the socio-culture. (Kim, 2001)<sup>14</sup> The interactions between firms, customers and suppliers help develop new areas of technology and shape learning and creation. On the macro level, the cultural and social context, institutions, organizational framework, infrastructures, and the knowledge distribution processes help shape firms and nations towards more innovation (Smith, 2000)<sup>10</sup> and propel technological evolution, therefore improving long term economic performance'. (Amable 2000, p. 645)<sup>15</sup>

It has been argued that due to the effects of globalization, nations are no longer an important factor for growth, and the integration of products with capital markets makes it hard for effective policies to be set by governments, and for them to make meaningful interventions in the market. (Ohmae, 1990)<sup>16</sup> For firms to achieve competitive advantage in a globalized world, there needs to be a broader view on global strategy, to focus on international competitiveness and strategic intent. (Hamel, Gary and Prahalad, 1985)<sup>17</sup> The most influential of all was probably the argument by Theodore Levitt, who believes that the changes in technology and social behaviors worldwide are converging differences in national and regional preferences (Levitt, 1983)<sup>18</sup>, and therefore implying that globalization is <https://assignbuster.com/the-systemic-aspect-of-innovation-economics-essay/>

eroding the role of nations as important subjects of technological change. However, because the foundations and scope of national policies are largely affected by the variances in political institutions (Hall and Soslice, 2001)<sup>19</sup>, both governments and institutions will remain important in developing the framework and context of economic behavior. (Hirst and Thompson, 1997)<sup>20</sup> Michael Porter summed up the arguments by saying: ‘ With fewer impediments to trade to shelter uncompetitive domestic firms and industries, the home nation takes on growing significance because it is the source of the skills and technology that underpin competitive advantage.’ (Porter, 1990, pp. 19)<sup>13</sup>

## **The Case of South Korea**

With a GDP per capita of \$29, 000 (OECD factbook 2012 statistics)<sup>21</sup> and being the most technologically adept and highly educated nation, South Korea is among one of the most innovative countries in the world.

(The Global Innovation Index)<sup>22</sup> The socio-culture and history of South Korea played an important role in the transformation from poor (GDP per capita of just \$80 in the 1960s), resource scarce agricultural country with a limited education system and little R&D, to a highly industrialized and innovative nation. After emerging from the Japanese occupation and the Korean War, South Korea had grown from poverty to prosperity very rapidly, with the help of a combination of support from the United States, hardworking people of Confucian culture (Samovar and Porter, 1988)<sup>23</sup> who still held memories of deprivation during the wars, technological capabilities, and large conglomerates supported by the state. (Kim, 1993)<sup>24</sup>

## **ICT and technological capability**

In the early 1980s, Korea went through a phase of imitative reverse engineering of foreign technology, due to the lack of experience and financial resources to negotiate with foreign suppliers. Technological change was a major determinant of Korea's economic development, and helped to propel the nation into rapid industrialization (Kim, 1993)<sup>24</sup> Large scale knockoffs and clones of major foreign products were produced and affixed with domestic brand names, while the Korean government supported and developed the strategic ICT industries, and facilitated technology transfer of capital goods, with restrictive policies in order to reduce the costs of technological learning. This forced firms to expedite learning and develop their own technology intensive products. (Kim, 1997)<sup>25</sup> Although the ICT policies had worked well in the 1970s through the 1980s, there exist a need for reassessment of the positive correlation between ICT and economic growth. Research has found that the growth of GDP has not resulted in an increase in total factor productivity in Korea since the 1990s (Kim and Park, 2009)<sup>26</sup> and that there is a need to generate positive externalities and spillover effects, in order to accelerate the growth of total factor productivity and boost innovation. (Schreyer, 2000)<sup>27</sup> There is also a need to improve technologies and standards policies, raise public awareness for the use of standards, and provide firms with commercialization support, in order to improve technological catch-up with other countries through innovation. (Choung et al, 2011)<sup>28</sup>

## **Chaebols and the Financial Sector**

Powerful conglomerates, or Chaebols, have been the ones that led Korea to her miraculous transformation. With a combination of Korean's entrepreneurship spirit and well trained human capital, the Korean government had used various policies to promote the competitiveness of Chaebols to gain comparative advantages in the world economy. As the controller of commercial banks, the government provided preferential financial funding (Cho, 1988)<sup>29</sup> and tax incentives to successful conglomerates, which helped them to sustain international competitiveness and boost trade exports. (Kim, 1993)<sup>24</sup> This approach eventually expedite the formation of monopolistic and oligopolistic structures, leading to mismanagement of finances, bribery, corruption and lack of transparency in the system. (Kim, 2001)<sup>14</sup> Reforms in financial liberalization were implemented to improve efficiency in resource and finance allocation. However, with the poorly managed system and thought out processes and strategies, the reforms had severe implications during the financial crisis in 1997. (Cho, 2001)<sup>30</sup> Though positive outcome of the reforms remain to be seen, there are signs that the liberalization of finances are resulting in more positive effects in the generation of innovations, (Ang, 2009)<sup>31</sup> especially innovative activity in SMEs (Rhee et al, 2010)<sup>32</sup>, thereby inducing higher growth in the economy.

## **Education, R&D and Knowledge Distribution**

Education plays a part in Korean society, and was a key factor in her transformation in the early days of industrialization. Numerous education institutions were set up, and there was a heavy focus on developing a high

quality education system on all levels. (Kim, 2001)<sup>14</sup> Traditionally, Koreans have toiled long and hard in terms of education and at work in order to move away from poverty, which helped the nation to advance at a rapid pace of development. As Korea move towards a knowledge economy, the education system was seen as a bottle neck, due to the creation of a culture of cramming and ' educational masochism' (Ripley, 2011)<sup>33</sup> in the education sector. This has hindered the nurturing of creativity and new knowledge creation, and placed Korea at the crossroads of a radical education reform. (Chang, 2008)<sup>34</sup>

In the early days of industrialization, there was a heavy focus on training quality skilled manpower, with the help of government research institutes, in order to build a good foundation for which to improve and learn from imported technology. (Kim, 2001)<sup>14</sup> The first government research institute was set up (KIST) in the 1970s, which helped to train skilled manpower to facilitate technology transfer of foreign capital goods. In the late 1980s, in order to build up a higher caliber of workforce that focus of science and technology, a government funded independent research institute, the Korean Institute of Advance Science (KIST), was established. (Yim and Kim, 2005)<sup>35</sup> However, in universities, funding for research and development has always been restricted by rigid central control which mimicked the Japanese administrative system and constrained the interactions between universities and the industry. There exist a high degree of conformity in the compensation and control of R&D (Sohn and Kenney, 2007)<sup>36</sup>, which is further execrated by the fact that whenever an invention was made with help from research funds from the government, the rights to file for patents



would belong to the government. This had made inventors hesitant to file for patents, and preferring to transfer the invention to firms, in order to obtain more research funding. (Lee, 2002)<sup>37</sup> In order to develop better innovative capabilities, in the late 1990s, Korean universities were reformed to promote entrepreneurship based on university research, and collaborations with the industry through technology parks were encouraged. Universities were also allowed to handle patenting and transfer of technologies, and regulations were passed to allow universities to 'spin out' into corporate ventures and establish companies to commercialize their products and research. (Sohn and Kenney, 2007)<sup>36</sup> A large number of public institutions will be relocated to Seoul, to foster clusters of regional innovation, in order to promote balanced national development and expedite active learning. (Yim and Kim, 2005)<sup>35</sup> These measures have proven to work so far, as seen in the rapid growth of Gross Domestic Expenditure on R&D shown in the science and technology indicator, from a low of \$7, 140 million in 1990, to a high of \$53, 000 million in 2010. (OECD S&T indicator)<sup>38</sup> There has been a rapid increase in the number of patents filed in the USA by Korean companies (one third of it coming from Samsung), from a total number of 3500 patents in year 2000, to 12, 500 patents in year 2010. (USPTO patents report)<sup>39</sup> 38 Success can also be implied in the growth of 'research and development expenditure (% of GDP)' from 1% in the early 1990s to 3% in 2009, and the 'no. of researchers in R&D per million people' from 2, 200 in 1996 to 5, 000 in 2008. (Data from The World Bank)<sup>40</sup>

## **The Labor Market**

The labor movement in Korea has historically been suppressed, due to the complications of organizations of unions since the 1960s, in order to maintain a rapid economic development. (Kim, 2001)<sup>14</sup> In the 1970s, an act was passed which required students to participate in industrial training, in order to develop a vocational training framework and develop the nation's educational goals. (Kwon, 2011)<sup>41</sup> Informal labor unions were later formed in order to elude censorship from the government. Following the assassination of the President in 1979, military regimes were put to an end after a great labor offensive, and unions were given more emphasis to voice opinions about labor issues, as well as given more authority to build up educational programs with the help of the government. (Kwon, 2011)<sup>41</sup>

Due to the rise of the unions and labor movement, the shifts in power have created more labor unrests; workers who traditionally orientated towards Confucian work ethics (Choi, 2004)<sup>42</sup> are becoming less submissive than before (Kim, 2001)<sup>14</sup>, and has forced a transition of human resource practices towards American policies, especially following the IMF reforms after the 1997 crisis. Korean companies have always relied on cheap labor and the productivity of its workers to compete in the exporting of goods. Over the years, Korea's per capita income is slowly converging towards that of Japan and the United States (OECD 2012. Going for Growth)<sup>43</sup>, and has forced the nation to find ways to nurture innovative cultures among the workforce, in order to compete in the international markets. There is an increasing number of firms that have focused on creating domestic technological innovation, in order to limit the dependence on the importation

of technology. (Dickerman, 2000)<sup>44</sup> So far, Korea's policies and investments in good education and R&D knowledge have resulted in the growth of a capable and competent workforce (Kwack and Lee, 2006)<sup>45</sup>. In order to sustain the nation's current economic growth, there have been policies set in place by the government to improve the participation rate of women in the workforce, to improve the productivity of various sectors, as well as to narrow income inequality and promoting of social spending to address the problems of Korea's rapidly ageing workforce. (OECD 2012. Going for Growth)<sup>43</sup>

## **Conclusion**

As implied from a rank of 19 in relation to other innovation driven countries (World Competiveness Report 2012-2013)<sup>46</sup>, there is an increasing need for Korea improve workforce education, and to adapt herself to move away from the traditional catch-up model into a better model of innovation. In the past, Korea has adopted a regional innovative strategy in order to transition into a knowledge based economy (Park, 2001), but the overall strategy is still based on technological development and less on innovation. There is a need to reform the configuration of NIS in Korea to take a broader socio-economic context, and develop better linkages between the different actors of innovation. (Suh, 2000)<sup>47</sup>

There have been considerable steps taken since then, with the nation being the leader in terms of broadband penetration (Picot and Wernick, 2007)<sup>48</sup>, in order to improve economic growth and competitiveness. There has also been an increase in government expenditures in R&D, and in integration of various policies, reforms, infrastructures and government structures in order to

<https://assignbuster.com/the-systemic-aspect-of-innovation-economics-essay/>

promote better interaction of the private sectors and the government, and to facilitate and promote early stages of innovation development. (Kim, 2012)<sup>49</sup> Perhaps, there is a need to find new ways to develop synergies among the different actors of the NIS, maybe through adaption of a different model to further their knowledge-based economy (Leydesdorff, 2012)<sup>50</sup>, in order to adopt less of a follower approach of development.