

## Open Innovation: A New Paradigm in Science and Technology

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*Secrets are edged tools*

*And must be kept from children and from fools*

John Dryden<sup>1</sup>

Science is not as open and unguarded as the common man assumes it to be. Both openness and secrecy in one form or another remains associated with science, wherever or whenever it is practiced. Science is thus a part open – part secret activity. This is one of the fundamental contradictions in science. The recent upsurge of open innovation and open access to science movement is partly a reaction to this key problem.

But why this duality of openness and secrecy gets into science is a much big and complicated issue. There is perhaps no single answer to it. Looking back at its origin, one school of thought suggests that the science evolved from magic, and thus secrecy was a hallmark of all proto-science activities. They say; perhaps, that legacy is still being continued. The history of pre-modern science related activities, and cultural milieus that bred such activities, both in East and West, bears ample testimonies to this concept. But, how about modern science?

We all know that modern Science exalted openness as one of its most cherished intrinsic and essential quality. While defining ethos of modern science Robert Merton referred communism, or common-sharing of everything, one of its central axiom<sup>2</sup>. But, opponents argue, that in real or actual practice, this attitude is not at all universal in science. Indeed, Mertonian “communism” and other ethos of science largely remained as an ideal situation in its day to day practice (Fig. 1). Hence, one can surely ask the question, what constitutes openness in science in real world today, and what encourages its secrecy?



Fig. 1. Robert King Merton (1910-2003)

### ***Secrecy: the dark side of science***

Although, free and open exchange of ideas are rhetorically held as sacred by almost every scientific and science institutions in the world, to protect their own interest - secrecy gets a sacred sanction by the very same institutions. In practice, secrecy and openness are so interdigitated in science that we can

easily call secrecy – the inseparable dark side of science. At least 3 impetus of secrecy we can recognize easily. We will introduce them briefly, one by one.

Firstly, the modern science is a highly competitive game. Winning the game, and to stay ahead of others, is very important in almost all scientific practice. Hence, in the desire to protect their own interest and to insulate them from the risk of competition – practitioners of science often withheld vital information regarding their discovery or innovation. Thus, competition breeds secrecy.

The second factor contributing to secrecy in science is the commoditization of science. Ideally, only invention needs to be protected – but discovery and innovation are supposed to be of open access to all. But, as upstream and downstream activity to invention – discovery and innovations too are usually protected and guarded heavily in science. Wherever – industry is involved in science, or has interest in its deliverables – this is a rule, rather than the exception. Even knowledge from open public domain or traditional knowledge domain is often gets misappropriated by the Industry through patents and IPR laws (by bending those laws). Thus, openness gets a beating!

The third factor promoting secrecy in science comes from the side of the government. Daniel Patrick Moynihan (Fig. 2), the Democrat senator in US Congress once



Fig. 2. Daniel Patrick Moynihan (1927-2003)

said, an inspection of government classified information in 1997 in US led to an official count of more than 6.6 million secrets, of which only 1.5 percent is related to atomic energy statutes! The United States Government is not alone in this game. All state power throughout the world promotes secrecy. Moynihan bluntly acknowledged, that the real cost of this massive effort to keep information from the American people is really “clogging up” open debates and exchanges of information in united states - that are essential for democracy to work. We know – openness is essential for science as well. One reason why Japan could beat US in the innovation game in pre-globalised 20th century technology war is – Japan's miniaturized basket of government secrets. Compared to US, Japan

kept their state protected secrets it minimal and effective.

This experience is vital. A main focus of science and technology studies is to unravel its mechanism. In doing so, highly organized current science in advanced nations have been often described by many as a triple helix, where Academy, Industry and Government intermingle with one other<sup>3</sup>. As both Industry and Government normally promote secrecy - unless open access is prioritized - in long term, triple helix might typically deter science. The rise and fall of Japan in innovation game reflects the short-term achievements of triple helix and its long-term decline. The analysts believe that the sluggish after effect of triple helix, after its initial bump and slump, is almost inevitable in any state or society.

## *Globalization: Resurgence of Openness*

Although barriers to openness exist, science often tries to transcend those barriers. The era of globalization, in certain sense, improved the chances of such transcendence. Such macro-level adjustment between globalization and openness exist, and it is no secret. It is largely a corporate culture driven change, which directly undermines state - apparatus. In this sense, globalization can be seen as an openness initiative in mega scale. Open innovation is the buzzword which captures and expresses this transition. Transition from local to global, national to international is its goal. However, micro level operatives of globalization are not so visible. The world today is complex, uncertain and dynamic. It is in constant flux. The key survival strategy in this world in flux is to innovate and change.

We will take a very brief look here at few such agendas of openness initiative.

## *Open Innovation Model*

Henry Chesbrough of Haas School of business in 2003 has published a book entitled, *Open Innovation: The new Imperatives for creativity and profiting from technology*<sup>4</sup> which exposes how the game of innovation has changed in this new global era. The companies that don't innovate are destined for death in this era. In one sense, this is the crux of the matter in so called "Knowledge Economy" (Fig. 3).

The innovation today has taken a new turn within the corporate R&D laboratories. The essence of such R&D practice used to be the controlled environment. That controlled environment idealized the real world at macro level, by averaging out variations and local discrepancies arising from the micro-cohorts, and

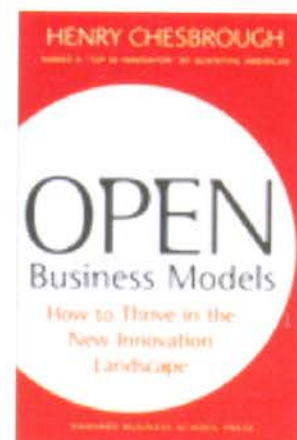


Fig. 3. Henry Chesbrough.

individual identities. The goal of today's innovation is to become local and personalized. Globalization today is different from all previous globalization in colonial era in this inward journey. The ICT (Information and Communication Technology) has provided the means to capture enormous amount of data, and to invade privacy - in a way, which was hitherto unthinkable. To cope with this new challenge - the laws related to IPR or the Intellectual property right is being changed to make better impetus in the new economic landscape. Thus, laws of copyright previously applicable for only literary works such as books, cultural items such as music, tapes, records etc are now extended to software and integrated circuits. The patent laws in USA were granted to the first to discover, not the first to file previously. This naturally used to generate numerous court case or law suits. Now a debate has started, whether patents should be issued to the first to file, which is the practice in the rest of the world.

Is this reformative mood in US IPR arena symbolizing a decline in US innovation edge? And if so, the actual impetus of open innovation paradigm may not be simply its so called democratizing and universalizing urge. Rather, there may be a hidden tendency in it to invade and capture innovation coming out of emerging economies - such as China or India.

## *Science for Science's Sake*

The overall situation in the western world regarding science and society is at present utterly confusing. The transition from industrial capitalism to knowledge based economy of corporate mercantilism has created this murky atmosphere. Rule of the game in science and technology is changing. Publication business - one of the important pillars of scientific enterprise has already internalized the message and signalling this transition. The old adage of science for science's sake

is no longer valid to them. For last two decades, post-modern critics relentlessly tried to put science as a social construct. However, their efforts were largely in vain. Suddenly, after the great depression mark-2, this has now become accepted as the main-stream ideology. Natural Science, Biological Science, mathematics, and social science were never as close – as it is today. Even specialized scientific journals are now carrying special sections on societal issues. Publication and media policy will undergo further reform in coming days. The high level political appointees from the government and from the corporate agencies will be the harbinger of this new approach. You will see openness in them and that will percolate to the rank and file STEMM (Science, Technology, Engineering, Medicine and Management) personnel.

## *Biotechnology: US and the Rest*

If we agree that Innovation is associated mostly to the part of economy which is fast moving, futuristic and a source of wealth and power then Biotechnology is the logical centre of this new age innovation. United States is the big player in this art since its inception. We can safely state - The empire of biotechnology is a more or less a US empire. The triple helix model of academy – industry – government tripartite, three stranded, intertwining collaboration axis is the dominant managerial model in US led biotechnology industry.

Bio power and bio politics however has attracted the intellectuals of all hues and colours, be they be Red, Green, Yellow or Saffron. Almost everyone has a say on this. However, very few actually recognize how US has build-up this biotech empire. United States is unique in its public spending of health, where molecular biology and biotechnology gets priorities since shortly after World War II was over. Actually, US created this branch of science and technology with a long term vision. The U.S. allocates more funds on health research, as a fraction of its gross domestic product, than any other nation. And a large fraction of this funding promotes its ever-growing the Biotech endeavours. The relative funding in engineering, chemistry, or physics followed quite a different trajectory in US. Actually, other western countries, and Japan or Korea have in that period allocated a higher fraction of their GDP devoted to physical and engineering sciences compared to America. The stark difference was almost qualitative. The backdrop of decline in US industry was created by this policy, where pharmaceutical research and manufacturers occupied the centre stage in US biotech venture.

Due to real progress as well as prize and propaganda, public opinion in US regarding biotechnology is very

different, compared to the rest of the world. This creates a pseudo-open environment and ambience in US on around modern biology and biotechnology. A section of the conservative politicians know this inside story – and some of them were staunch opponent of this policy on religious and moral ground. They were annoyed too by the slow progress and lack of net profit from biotechnology based industries.

## *Biotech India: OSDD or the Triple Helix Model?*

A sizable section in Biotechnology Industry in India wanted to copy the US biotechnology model, lock-stock and barrel. Currently, this section is leading Biotech sector in India. In the long run, how far this imitation can go – and what it can deliver to the public – only time will tell. The open source drug discovery (OSDD) model, focussing on TB and other neglected disease is one exception in the overall scenario<sup>5</sup>. This is a model, based on open innovation. OSDD is a CSIR-led team India consortium with a global partnership. Its vision is to provide affordable healthcare using global platform where the best minds can collaborate & collectively endeavour to solve the complex problems associated with discovering novel therapies for neglected tropical diseases like malaria, tuberculosis, leishmaniasis and other diseases. It is a concept to collaboratively aggregate the public database on biological and genetic information. This may provide a unique opportunity for scientists, doctors, technocrats, students and others with diverse expertise to work for a common cause.

The recent success of open source models in Information Technology (For e.g. Web Technology, The Linux Operating System) and some Biotechnology (in Human Genome Project) sectors highlights the urgent need to initiate a similar model in healthcare. Herein lays the genesis of this open source model for drug discovery (Fig. 4).



Fig. 4. CSIR, promoter of OSDD utilizing Genome Information.

The Government of India has committed Rs.150 crores (US\$38 million) towards this project. An equivalent amount of funding would be raised from international agencies and philanthropists. About Rs.46 crores (US\$12 million) has been already released by the Government of India<sup>5</sup>.

Which model will dominate the Indian biotechnology future - the Triple – helix model or OSDD is an undecided, open issue.

## Conclusion:

Secrecy in science sounds enigmatic, sinister and alarming. Yet, action of secrecy is a reality in the very domain of science. Scientific spirit as reflected in the openness of science seriously deteriorated under late age industrial capitalism due to such operation of multilayered secrecy. This created tensions, and harmed the scientific integrity. Now, we have both a chance and the necessity to change this milieu. Let us not forget that the organized scientific activity is nothing but a visible or invisible teamwork to understand nature - which can best perform only in an open platform<sup>6</sup>.

## References

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6. A brief synopsis of this article was first presented at the 27th Annual Convention of the Society for Information Science & Conference on Open Access Gateway to Open Innovation, held from November 24-26, 2010 at Kolkata.



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