Can the restrictive boundaries of intellectual property create a larger social impact?

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This note highlights broad societal concerns associated with the intellectual property (IP) system and presents illustrative case examples to show how firms can address such concerns to fulfil their corporate social responsibility while simultaneously enjoying exclusivity obtained through IP rights. IP-specific initiatives taken by mission-oriented private organizations suggest that if designed and exercised consciously and wisely, stronger and efficient IP policy systems can act as a powerful tool to realize better societal outcomes to achieve social sustainability.

Intellectual property (IP) rights are typically negative, where inventors and creators gain limited monopoly rights to stop others from using their new inventions or creations. Infringement cases like Roche versus Cipla[1], Bayer versus Union of India[2] and the recent lawsuit against Sci-Hub and Libgen[3] in multiple jurisdictions reiterate the negative emotions associated with IP rights and raise questions about the suitability of the IP system for social good or public welfare.

Policymakers, researchers and social activists point out the inherent inequality in the IP system. This is sometimes visible in the form of inequitable access to the IP system and its benefits to a specific section of inventors or creators (like grassroots inventors, women inventors, inventors with disability, etc.). At other times, this inequality becomes apparent in the form of limited access of IP-protected inventions or creations (like IP-protected essential medicines, copyrighted books, etc.) to a specific section of the users due to their inability to pay the rent-seeking price of the product. Therefore, societal implications of different IP regimes on the basic human securities become debatable concerns[4]. For example, the right to health may get potentially hampered with inequitable access to IP-protected essential medicines[5]. Similarly, the right to education may get infringed by inequitable access to copyrighted material.

In this note, we first identify broad societal concerns associated with the IP system and then present several illustrative case examples to show how firms can address such concerns to fulfil their corporate social responsibility (CSR) while simultaneously ensuring their economic sustainability by recouping the R&D cost associated with their inventions. At the national level, governments design their IP strategies taking advantage of the flexibilities of the TRIPS Agreement[6] (like Section 3(d) and compulsory licensing provision[7] of the Indian Patent Act, 1970). Similarly, individual firms can also play their part and design their firm-level IP strategies to meet their societal obligation or CSR without compromising their profitability obtained from the IP-protected products. Firms that develop their IP strategies or IP policies consciously, keeping in mind its impact on all stakeholders (like employees and customers), meet their social and CSR while enjoying their exclusivity privilege granted by the IP system.

There is a growing argument around the shared responsibility of all national and international actors in the innovations system to design and use their IP system or IP policy effectively in order to realize better social outcomes along with economic profitability. While we see examples where profit motives of firms outplay their societal obligations, we also find cases where firms, acknowledging their social responsibility, take initiatives to make their IP system and policy work for society. Unfortunately, in a policy debate, while litigation cases highlight the adverse effects of IP, other initiatives, examples and evidence get ignored where mission-oriented companies, industry associations and universities use their IP assets and strategies to promote social justice and equality. Here we make an effort to bring readers and policymakers to the other side of the story to draw a more holistic picture of the role of IP in social and economic sustainability.

We can see significant social impact in the equitable access of the IP system to the grassroots, rural innovators and holders of traditional knowledge. The first barrier pertains to the lack of awareness among grassroots inventors or creators about their rights on the IP created by them, different types of protection offered by the IP system, and how to manage, transfer and enforce such rights to protect their interests. Sometimes, grassroots innovators and communities choose to share their inventions and traditional knowledge openly with others. Still, their lack of documentation causes others to copy, patent and monopolize such inventions, creations, traditional knowledge or designs. Earlier cases where contentious patents were granted in the US for the medicinal use of powdered turmeric for wound healing, infringing traditional knowledge of India, clearly illustrates this point[8]. Even when grassroots innovators or communities manage to document their inventions or traditional knowledge, another barrier comes from the high cost of application for IP protection. Owing to these primary reasons, many inventors fail to get ownership rights over their IP even when they have high quality, unique and promising inventions.

Mission-oriented organizations play a role to fill this gap by engaging with grassroots innovators and creators through associations, networks or building a social enterprise or entering into other forms of engagement under the aegis of their CSR activity. They engage with rural inventors or creators to make them aware of the IP potential of their invention or creation and impart the necessary skills and training to enable them to generate, protect and own IP on such inventions. A well-suited example is the case of Tata Chemical Limited. Owing to its association with the well-known brand of 'Tata'[9] and high brand recall value, Tata Chemicals established an association with the rural women community to create a social enterprise named Okhai[10]. By sharing technological know-how and the parent brand name, the company helps these grassroots creators develop their own fashion brand of handicraft products and gain ownership of IP of their designs. Sometimes, social activists and social scientists come together with the policymakers to fill the gap of equitable access to the IP system. One of the earliest such examples in India is the Honey Bee Network that started the grassroots innovations movement in the country in 1986 to encourage grassroots innovators, artisans and creative farmers to demonstrate their inventive ability and provide the opportunity to highlight their innovation capabilities[11]. It took the initiative to bring together such small innovators and provide equitable access to IP ownership rights to grass root inventors.

Equitable access to the IP system also applies to gender equality. Gender inequality in science, technology, engineering and mathematics (STEM) is a well-researched and widely debated topic. A 2016 World Intellectual Property Organization (WIPO) survey report on the Patent Cooperation Treaty (PCT) applications shows that only 29% of all PCT applications from 1995 to 2015 included women inventors[12]. Another report from the USPTO shows that only 22% of patent applications contained at least one women inventor in 2019 (ref. 13). There is hard evidence that though women are more likely to work in larger research groups and contribute in all fields of intellectual endeavours, they are less likely to patent than men. Early studies have also mentioned that many patents that are ‘taken out in some men’s name are, in many instances, due to women’[14]. Some early examples of this disparity are visible in the inventions of cotton-gin and under glaze painting on pottery. While the invention of cotton-gin resulted from the collaborative efforts of Catherine Greene[15] and her associate Eli Whitney, the patent was granted to Whitney. At the same time, Greene’s second husband later assumed the subordinate interest in it. Similarly, Mary Louise McLaughlin’s invention of the under glaze technique of painting on pottery was patented by a man, prohibiting even the inventor from using her invention.

To address gender inequality in STEM in general and the low representation of women inventors in IP protection, several companies have initiated steps to ensure equitable access of IP protection to women inventors. For example, in 2011, 3M started a programme to increase women workforce in technical fields within the company. Similarly, in 2016, Microsoft started the #MakeWhatsNext Patent Program to provide mentorship to the women inventors in the patent filing process[16]. Individual enterprises and associations are coming together to address the issue of gender disparity in the patent system. For example, members of the Intellectual Property Owners (IPO) association (like 3M, IBM Corp., General Electric Co., Google LLC and Microsoft Corp.) together with technology-transfer professionals, developed a toolkit of best practices and resources for boosting the diversity of inventors[17]. This toolkit aimed to help companies learn about their implicit biases and create a more inclusive inventor community. Following suit, several other companies have started proactively asking themselves about the proportion of their total R&D competency/new inventions that come from women workforce/inventors. Additionally, they are trying to determine what measures can be taken to ensure gender equality in their R&D workforce.

Equitable access to IP-protected essential medicines in low- and middle-income countries is another area of public debate. To address this issue, many firms and universities are considering the option of royalty-free licensing to these countries. The example of AstraZeneca, a British biopharma, shows how companies are ensuring equitable access in healthcare systems. AstraZeneca did not file patent applications in any low-income countries or least developed countries[18]. The company agreed to make available to WIPO around 1,400 patent families and over 25,000 patents granted or pending, and associated know-how for advancing research in neglected tropical diseases, including tuberculosis and malaria. The company moved away from its profit-motivated R&D models in geographical locations/areas where equitable access will be an issue.

With this note, we contend that companies have started asking themselves how they can leverage IP rights to address issues relevant to the bottom of the pyramid. Examples in rural innovation, health and gender equity suggest how the institutions involved in the adoption and enforcement of IP rights partially determine the impact of IP on each set of outcomes. We see clear examples of how companies with IP rights have used their exclusivity privilege to make a social difference in the world. IP-specific initiatives taken by mission-oriented private organizations suggest that if designed and exercised consciously and wisely, stronger and efficient IP policy systems can act as a powerful tool to realize better societal outcomes to achieve social sustainability.

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How much do we know about the threat of combined stresses in Indian agriculture?

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Pathogens and pests continue to evolve new strains and variants, with different levels and mechanisms of resistance. Meanwhile, the earth faces unprecedented changes in global climate. Together, various stress combinations can have devastating effects on agriculture. Studies focusing on combinatorial effects of different stresses and novel strategies to control them are urgently warranted for food security. This note enumerates the occurrence and impact of combined stresses and the efforts made by Indian researchers to explore this aspect. Through this write-up, we hope to draw attention to the need for expanding research in this area in India.

Global climate change poses a threat to current agricultural practices, necessitating innovative methods to brace for the changing scenario. Over 50% of India's population is dependent on agriculture, and the agricultural yield remains lower than its potential[1]. This yield gap is ascribed to various factors such as unpredictable weather conditions (abiotic factors), and disease outbreaks and pest attacks (biotic factors). Of significant concern is the combined occurrence of these abiotic and biotic factors, which can intensify crop damage. Despite its deep ecological and economic implications, there remains a lack of understanding of the combined effect of stresses on crop plants, specifically in the Indian subcontinent.

Combined stresses in Indian agriculture: some examples

In nature, abiotic and biotic factors can simultaneously cause stress to plants, and two or more of these stress factors can concurrently affect plant growth. Broadly, combined stresses can be categorized into three categories: biotic–biotic, abiotic–abiotic and biotic–abiotic stress combinations. Prior exposure to biotic and/or abiotic factors can predispose plants to various other stress factors. For example, drought conditions can make plants more vulnerable to bacterial and fungal diseases[2]. A break-up of the contribution by each of these combinations to agriculture is difficult to determine, but in the Indian subcontinent the biotic–biotic stress combination contributes to significant yield losses. An example of biotic–biotic stress is that of plant-parasitic nematodes with other biotic stress factors (e.g. fungus and bacteria), resulting in huge crop losses. Reports from the past three decades show the interactions between fungi and nematodes. In maize, the interaction between *Fusarium moniliforme* (causal agent of wilt) and nematodes belonging to genera such as *Hoplolaimus*, *Helicotylenchus* and *Tylenchorhynchus* has been reported to cause premature senescence[3]. A survey conducted in Karnataka, India, showed an increase in *Fusarium* wilt (causal agent, *Fusarium oxysporum*) incidence across the state in the presence of *Meloidogyne incognita* nematode infection in popular chickpea cultivars Annegiri-1, Radhey and Avrodhi[4]. The disease complex of the root-knot nematode *Meloidogyne incognita* and root rot fungus *Rhizoctonia bataticola* in chickpea resulted in a yield loss of up to 40% (ref. 5). In lentils, simultaneous infection of root-knot nematode and *Fusarium solani* resulted in synergistically reduced pod yield and plant biomass compared to individual stresses[6]. Simultaneous infection of *Meloidogyne javanica* and *Macrophomina phaseolina* was also reported to reduce growth and pod yield in lentils[7]. Likewise, there is a high possibility of the occurrence of other biotic–biotic stress combinations, e.g. bacteria belonging to the genera *Pseudomonas*, *Ralstonia* and *Xanthomonas*, along with other disease-causing organisms such as