

Intellectual Property and Innovation— The Key to Sustainable Economic Growth

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[Abstract] The world is at an inflection point. New technologies are leading society through the fourth industrial revolution, yet millions of people do not have reliable access to clean drinking water. For society to ameliorate the world's qualms while enjoying economic prosperity, it must adopt a new definition of the phrase "sustainable growth"—a definition that is inclusive of both economic and societal sustainability. This paper provides such a definition and then identifies intellectual property dependent programs, standards and technologies that are already helping society achieve sustainable growth. As long as society continues to champion the strong and balanced intellectual property rights that enable these programs, standards and technologies to succeed, one cannot help but get excited for the prospect of worldwide sustainable growth.

[Keywords] sustainable growth economic sustainability societal sustainability intellectual property rights standards blockchain

1. Introduction

This is an important time for our planet and for the advancement of the human condition. Today's world is at an inflection point. It has entered the fourth industrial revolution—a potentially tremendous era of economic growth spurred by the ability to integrate useful technology into every aspect of modern life. Yet, over 800 million people worldwide still do not have reliable access to clean drinking water and 2.6 billion people still must face the darkness of night without the security of electric light.¹ These are big problems. But, they are also big opportunities for sustainable growth as we fuel the impending technological revolution.

This paper will provide a new definition of "sustain-

able growth" and then outline how innovators can create sustainable growth in tomorrow's world using technologies and programs existing today. To begin, this paper will provide a definition of the phrase "sustainable growth" that is inclusive of both economic and societal sustainability. Then, it will examine the connection between intellectual property rights ("IPRs") and the Sustainable Development Goals ("SDGs") set forth in Resolution 70/1 of the United Nations General Assembly. An overview of SDGs will lead to a review of historical and currently running programs involving sustainability, including the Eco-Patent Commons, the Climate-Patent Acceleration Program, the Patents for Humanity program and others that are already reshaping our world. Discussion of these programs will lead to consideration of the crucial importance of standards in achieving sustainable growth. Lastly, this paper

will conclude by discussing blockchain’s tremendous potential to play a positive role in sustainable growth and the major policy and legal issues that must be resolved to achieve this growth.

2. Defining “Sustainable”

The word “sustainable” has two overlapping but distinct definitions. The first is “capable of being sustained”—capable of maintaining a certain rate.² This is the definition that comes to mind when speaking about sustainable economic growth. The second definition is “harvesting or using a resource so that the resource is not depleted or permanently damaged.”³ This definition applies most clearly to societal sustainability.

As the U.S.’s recently published Fourth National Climate Assessment report shows, the overlap between these two definitions as they apply to sustainable growth increases daily. The Fourth National Climate Assessment report was published in November 2018 by the U.S. Global Change Research Program, which was formed to “assist the U.S. and the world to understand, assess, predict, and respond to human-induced and natural processes of global change.”⁴ A key takeaway from the report highlighting the overlap between economic and societal sustainability is quoted below:

Without substantial and sustained global mitigation and regional adaptation efforts, *climate change is expected to cause growing losses to American infrastructure and property and impede the rate of economic growth over this century.*⁵

The report goes on to warn that unless more societally sustainable steps are taken, “annual losses in some economic sectors are projected to reach hundreds of billions of dollars by the end of the century.”⁶ Put simply, one can no longer expect sustainable economic growth without increased adoption of ecologically and societally sustainable technologies.

Due to this increasing overlap, this paper will inten-

tionally conflate the two definitions of sustainability when discussing sustainable growth.

3. IPRs and SDGs

It is crucial to have a clear understanding of what constitutes sustainability when speaking about sustainable growth. Fortunately, the United Nations already produced a comprehensive picture of sustainability when it published *Resolution 70/1 of the United Nations General Assembly—Transforming our world: the 2030 Agenda for Sustainable Development*.⁷ This resolution provides “a plan of action for people, planet and prosperity” and lays out a series of SDGs to improve the economic fortunes of all world citizens.⁸ Certain SDGs that are directly benefited by strong IPRs are discussed below.

The most obvious is SDG 9, which calls on United Nations members to “build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.”⁹ SDG 9 then goes on to set forth a list of targets that must be met to achieve the goal. The targets include “upgrad[ing] infrastructure and retrofit[ing] industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes”¹⁰ and “encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending”¹¹. These targets explicitly recognize the need for continued sustainable innovation.

As numerous studies correlating patent strength and economic growth or investment in research and development have shown,¹² a surefire way to foster innovation is through strong IPRs. This proposition is further supported by surveys finding that patents incent innovation in important technology sectors.¹³ Thus, it is safe to say strong IPRs are necessary to achieve SDG 9.

However, SDG 9 is not the only SDG that requires

strong IPRs. As Francis Gurry, the Director General of the World Intellectual Property Organization, has recognized:

Intellectual property as a policy exists to create an enabling environment for—and to stimulate investment in—innovation; to create a framework in which new technologies can be traded around the world and shared. *The economic imperative at the heart of innovation is fundamental to the process of societal transformation that the Sustainable Development Goals aim to achieve.*¹⁴

This enabling environment is created by intellectual property's unique ability to balance the incentives for innovators to innovate, with the benefits received by the public from the innovators' innovations.

In this balance, innovators receive the incentive to invest in innovation, created by the promise of a future patent. Patents provide innovators the potential to recoup past investments through a time-limited monopoly and the corresponding opportunity for royalties, which also provides capital to fuel future innovation.

In exchange, the public receives a contribution to the knowledge pool through disclosure of the invention and the right to practice the invention freely once the patent expires. The bargain allows all of society to benefit from the inventor's undertaking of the risk, labor and dedication required to innovate, all to the benefit of the global human state.¹⁵

The above described balance is required to meet SDG 3, which calls on United Nations members to “ensure healthy lives and promote well-being for all at all ages”¹⁶. While life expectancy has increased in many countries across the world over the past century, this increase cannot be expected to continue without continued investment in new drugs and treatments.¹⁷ Such investment cannot be expected in high-risk industries, such as the pharmaceutical and biotechnology industries, that require significant research expenditures to create consumer-ready products, without the promise of strong IPRs for successful treatments.¹⁸

Likewise, IPRs are needed to meet SDG 7 and SDG 13. SDG 7 calls on United Nation members to “ensure access to affordable, reliable, sustainable and modern energy for all”¹⁹. SDG 13 requires members to “take urgent action to combat climate change and its impacts”²⁰. Responding to these challenges, inventors around the world filed over 14,800 patents for solar power, wind energy, biofuels, hydropower, geothermal energy and waste-generated energy technologies in 2017.²¹ This is a 43% increase over the number of patents filed in the same field in 2016.²² As innovators in the renewable energy field are increasingly recognizing, strong IPRs go hand-in-hand with achieving commercial success while meeting the ambitious SDGs set out by the UN.²³

The United Nations is not the only organization participating at the intersection of intellectual property and sustainable growth. There are numerous other government and industry-led groups seeking to harness and guide the power of innovation to obtain sustainable growth. While there are many groups shaping the future, a few select programs are highlighted below.

4. Eco-Patent Commons

The first of these groups is the Eco-Patent Commons, an industry-led initiative to create a patent pool for patents that cover environmentally beneficial technologies.²⁴ The idea behind the Eco-Patent Commons came about after an internal review at IBM showed IBM possessed a surprising amount of intellectual property that, while not obviously valuable “through the traditional enforcement of patents,” could be used by other companies to improve the environment and to create innovative eco-friendly technologies.²⁵ The Commons started in January 2008 with 31 pledged patents, and has grown to include about 100 patents as of September 2015.²⁶

The motivation behind the Commons is not solely philanthropic in nature, as members benefit from “the

opportunity to leverage the pledged patents through further innovation, collaboration efforts, and other relationships with businesses that have similar interests.²⁷ In this way, the Commons provides “a new way to use patents for a strategic purpose that creates bottom-line business benefit to your company.”²⁸ With pledged patents covering inventions “from cleaner solvents to recycling cell phone components to ecological packaging to resource management”, the Eco-Patent Commons provides a template example of how societally sustainable progress leads to economically sustainable growth.

5. Climate-Patent Acceleration Program

A second program that warrants mention is really a collection of programs conducted by the United States Patent and Trademark Office that are broadly referred to here as the Climate-Patent Acceleration Program.

The first of these programs is the Green Technology Pilot Program, which launched at the USPTO in December 2009.²⁹ Under this program, patent applications pertaining to certain green technologies including “environmental quality, energy conservation, development of renewable energy resources or greenhouse gas emission reduction”³⁰ were given special status at the USPTO, which allowed patent examiners to begin reviewing the patents immediately. The Green Technology Pilot Program met its goal of promoting green industry, as in less than three years, the USPTO received 3,500 patent applications under this program³¹—500 more patent applications than originally expected when the program was announced.³² Through the program, numerous world-altering green technologies came to market approximately 30 months earlier than they would have without the program.³³

After this successful pilot program came to its conclusion, two other programs were provided by the USPTO to decrease the time it takes to obtain patent rights for sustainable innovations. One of these pro-

grams, the Prioritized Examination (Track I) program, aims to provide applicants a final decision within 12 months of prioritized standing being granted.³⁴

The second program, the Accelerated Examination Program, is even more conducive to fostering sustainable growth, as it provides a similar patent prosecution timeline as the Track I program, but does not charge innovators any extra examination fees if the claimed subject matter “will materially enhance the quality of the environment or contribute to the development or conservation of energy resources.”³⁵ In total, the Climate-Patent Acceleration Program provides applicants attractive pathways to get their innovations to market quickly without sacrificing intellectual property protections.

6. Patents for Humanity Program

The last sustainability program highlighted in this paper held its fifth successful awards ceremony at the USPTO in November 2018. This program, called Patents for Humanity, “was launched by the USPTO in February 2012 as part of an initiative promoting game-changing innovations to address long-standing development challenges.”³⁶ Under the program, the USPTO recognizes innovators who are solving pressing global issues in five distinct categories: medicine, nutrition, sanitation, energy and living standards.³⁷ Beyond public recognition, the innovators receive a certificate to accelerate certain matters before the USPTO.³⁸

In 2018, the types of innovation recognized by the Patents for Humanity program ranged from adjustable sandal-like shoes created by Because International to a novel and inexpensive drilling method developed by Russell Crawford that can be used by only two drillers without heavy equipment to reach fresh water aquifers hundreds of feet deep around the world.³⁹ Along with the types of innovation recognized, there was also a large range in the size of entities that received awards, varying from Medtronic PLC, a global medical device

company with \$30 billion annual revenue that developed a portable kidney dialysis machine, to Kinno Inc., a small biotechnology company founded by Columbia University students in 2014.⁴⁰

Kinno was launched to commercialize an idea developed by undergraduate students at Columbia University who participated in Columbia's Ebola Design Challenge to help fight the Ebola crisis in West Africa. During that crisis, 1 in 20 deaths was a healthcare worker, many of whom died due to improperly disinfected medical equipment.

Recognizing that problem, the students who founded Kinno developed an idea that is brilliant both for its simplicity and effectiveness—an additive for disinfectants that (i) colors the disinfectants blue to easily show what has and what has not been disinfected; (ii) modifies the properties of the disinfectants to which it is added to better adhere to surfaces; and (iii) fades from blue to clear once sufficient time has passed to allow the disinfectant to which it is added to work.⁴¹ This is exactly the type of innovation the Patents for Humanity program was developed to recognize, and shows how sustainable development can both benefit society and create new business opportunities. It also nicely exemplifies university-industry cooperation for sustainable economic growth.

7. Standards

So far, this paper has discussed the innovation required to achieve sustainable growth, but that is only one side of the coin. The other is ensuring innovations are actually adopted and implemented. This is the role played by industry standards and standards-setting organizations.

Consider the breathtaking pace at which mobile phones have altered our world. Today, mobile devices can communicate across networks, access social networking and video streaming services, receive and send text messages and emergency notices and even perform the functions of a bank by enabling seamless

money transfers.⁴² None of this would be possible without widely adopted, highly innovative standards in the telecommunications industry.

And all of these successes are just previews of what will be achievable once 5G wireless systems are widely adopted. Suddenly, drivers—or the cars in which they are passively sitting—will be able to connect with the roads and other vehicles around them, patients and their secure medical histories will be able to connect with the medical practitioners they trust, and increasingly digitalized industries will be able to reach new efficiencies across a vast spectrum of commercial endeavors.⁴³ All of this is already being made possible by telecommunication standards—and the telecommunications industry is not alone in broadly adopting such standards.

Other standards, such as the CRISPR-Cas9 standard currently being created by MPEG LA, which seeks to standardize the immense potential of gene editing,⁴⁴ and the ISO 14000 standards, which provide companies and organizations standards that to help them manage their environmental responsibilities,⁴⁵ also have the potential to play a role in achieving future sustainable growth. Standards enable sustainable growth because they place inventors and implementers in a productive state of “coopetition”. Companies benefit from interoperable components, interconnected devices, more efficient R&D spend and larger user networks, while consumers benefit from greater product choice, more product features and improved product performance, all at reasonable cost and with high reliability.⁴⁶

Innovation driven Industry Standards are vital to solving society's most pressing and vexing problems. And like with the intellectual property rights they often encompass, society must thoughtfully balance the incentives given to innovators to create new standards with the benefits given to the consumers and implementers that adopt the standards. For it is only through thoughtful management of innovation incentives that society can continue to promote sustainable, standards-driven growth.

8. Blockchain

Lastly, this paper would be remiss if it did not touch on one final technology while discussing the fourth industrial revolution and ways to ensure future sustainable growth. That final piece of technology sure to enable sustainable growth is distributed ledgers—blockchain.

Blockchain is a new kind of database that has five key features:

1. First, the database is distributed, meaning it does not just exist in one place. Instead, every participant on a blockchain keeps their own copy of the data stored on the blockchain.
2. Second, the database is encrypted to maintain privacy. Each participant on a blockchain has a private key—a self-created password—that allows them to access and control only the data that is theirs. These encrypted keys enable all parties on a blockchain to track data provenance, as the private keys act as a type of metadata that is inseparable from the underlying data.
3. Third, the database is managed by consensus, meaning each participant updates their own copy of the database according to a globally agreed set of rules and the only “true” version of the database is the version upon which the majority of participants have agreed. This makes it nearly impossible for nefarious actors to create fraudulent data entries on a broadly distributed blockchain.
4. Fourth, the database is “add-only”, meaning changes to preexisting data are recorded as new entries rather than as corrections that overwrite preexisting data. Once data is added to a blockchain, it is never altered.
5. Lastly, a blockchain database is immutable, meaning that once an entry is added to the database, it cannot be removed.

Through these five features, blockchain provides us-

ers a new way to maintain a secure, single record of truth among unknown and untrusted parties without the need for any trusted third-party intermediary. This broad shift away from needing a trusted intermediary allows society to reimagine centralized systems as distributed ones.

Once one begins to reimagine existing fundamentally insecure, costly and fragile centralized systems as distributed ones, it is not hard to imagine the level of sustainable growth widespread adoption of blockchain solutions can enable.

One blockchain solution already providing global sustainable growth is the TradeLens platform developed and implemented by IBM and Maersk. This program has three simple, overarching goals. The first is to promote more efficient and secure global trade. The second is to increase information sharing and transparency. The last is to spur industry-wide innovation.⁴⁷

TradeLens members are striving to meet these goals by incorporating IoT and sensor data onto a blockchain to provide real-time shipping data without compromising privacy or confidentiality. This platform, which was announced in January 2018, is built on open standards to increase industry adoption. There is ample evidence that the shipping industry is reacting positively to TradeLens, as by August 2018 it already had buy-in from more than 20 port and terminal operators, customs authorities, upstream and downstream freight forwarders and other related logistics companies around the globe.⁴⁸ This buy-in is likely a product of the early success of the platform, which has shown that it can decrease shipment transit time by up to 40% and reduce the number of individuals needed to track a shipping container from five to one.⁴⁹

The need for increased efficiencies is not unique to the international shipping industry. Other industries are also adopting blockchain solutions in an effort to spur sustainable growth. This includes members of the food supply industry, who have instituted a blockchain-powered food-tracking solution that can reduce

the time required to trace a contaminated piece of food through a distribution chain from 7 days to 2.2 seconds, and diamond distributors, who have placed digital “fingerprints” of millions of diamonds onto a blockchain ledger called Everledger that can limit the unethical spread of conflict minerals. While blockchain is not a silver bullet solution to all the world’s problems, the nascent technology has tremendous potential to provide sustainable growth.

9. Conclusion

Bringing together everything covered above, one cannot help but get excited for the world’s future. As the SDGs reveal, there are still many societal ills that plague far too many people in this world. However, as society progresses through the fourth industrial revolution, it possesses more powerful technologies than ever before. If innovation and innovators are championed with strong, balanced intellectual property rights and efficiency-producing standards, then society is sure to enjoy long-term sustainable growth.

Notes

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