



## When the Law meets Science: The supposed prospective nature of the Law when dealing with scientific and technological developments

Dr. Jowi Tsidkenu Cruz<sup>1\*</sup> and Atty. Jocelyn Cruz Ed.,D., LL.M.<sup>2</sup>

<sup>1</sup> *Physics department, De La Salle University-Manila*

<sup>2</sup> *Commercial Law Department, De La Salle University-Manila*

*\*Corresponding Author: jowi.cruz@dlsu.edu.ph*

**Abstract:** Science and technology has been exponentially evolving. With this, there is a consequent need for the Law to adapt in response to the sound logic developed through evidence based methods. Unfortunately, the improvements in the field of science and technology have been in startling leaps which the law evidently could not readily adapt to. While the generation of knowledge in science takes a lot of time, dedication, hard work as well as the diverse interest and global scale scientific feats and movements of the previous and current generations, the same have significantly altered the way we perceive the world. With this, the emergence of new avenues and platforms have become available for human interaction which unfortunately, is almost always not regulated by current legal standards. Hence, in many jurisdiction including the Philippines, the law becomes ambiguous and disabling. On the other hand, there is a perceived advantage with harmonizing the law closely to the scientific community. This paper examines several models of relationship in science and technology to compare and contrast and decide which suits the current times. The paper is poised to suggest that a Singularity Model is the most appropriate relation between law and science. A close mutuality between law and science would be enabling to both fields. Science can help the law to see farther than what is already tangible in the real world and is something which shall be taken advantage of by legislators. In fact, this paper suggests that awareness on the new breakthroughs in science in technology shall be mandatory for law makers. This paper proposes a new approach to law making through the inevitable scientific collaboration that will allow for a prospective creation of law. It also dwells on improving the statutory construction of new laws for them to have futuristic legal coverage as guided by forward thinking of the scientific community. The paper also identified the need to harmonize the law with the current scientific breakthroughs, and recognized the slow law-making process that shall be mended by assuring that legislated policies are prospective and flexible for conceptualized avenues. The paper also suggests that if new laws would be difficult to develop, there is a need to constantly update how existing law can be applicable in the recent practice in light of new scientific and technological development. The academic community as well is

enjoined in promoting the involvement of scientists in policy making—giving support and adequate credence to those who endeavor in the said field.

**Key Words:** Policy-making; Exploitation; Prospective law-making; Science and Law; Law and Science Singularity

## 1. Introduction

The marriage of scientific and technological development is a crucial aspect of improvement in the developing world. In recognition of this fact, policies aimed on promoting improvements on science and technology have long been available. A third party to this marriage is the Law. Together, they form part of the most important sources of authority for modern governments. (Jasanoff, 2005)

The triangular relationship was all too well that in the beginning their mutuality is seen in every aspect of human life. From food labels, automatic teller machines, medical prescriptions, census, digital identification, safety certification, until death certificates! In lay man terms the public display of affection was apparent.

However, the developments in knowledge generation and application in the field of Science and technology has been far from the preconceived steady increase considered by many policy-makers. This was start of the murky waters. In reality, the computer era has brought a steep exponential increase in the development and generation of new information under science and technology which the law had difficulty adapting to hence, the eventual lag of public policy.

These improvements in the generation of scientific and technological knowledge implicitly requires the law to respond appropriately and address newfound concerns. Without which, the disconnect, becomes an area of social concern. The relationship of Science and Law have been evolving. More traditional models include knowledge utilization models and technocratic model which

suggest science as mere source of utilizable objective knowledge for policy making. (Van Egmond & Val, 2011). Nowadays, a close mutualistic relationship is becoming the cornerstone of science-law marriage.

In reality however, the response of the law, if not delayed is incomplete and sometimes ineffective. As knowledge generation becomes increasingly fast, the demand for a responsive law becomes increasingly bigger.

This has brought about the idea of a close and mutual relationship between science and the law. This paper shall compare and contrast the said relationship to previous models and to identify a recommended model that is suitable for the current times.

### *1.1 Policies and Science*

While science remains to be in the realm of the academe and traditional interest in scholarship, theory, and mathematics should continue, there is a need to supplement these with an increased concern for science, technology, and society. (Hunter, 1983) The impact of these developments on human behavior and societies are well recognized and has been a point of study for many years already. An interesting aspect of this relationship is within the realm of science and its effect on policy-making and vice-versa.

In the past, the law was content on governing individuals rights, property and civil relations, and criminal legislation. However, with the advent of the now already 4<sup>th</sup> industrial revolution, the previously limited nature of the law has had to evolve to be able to govern the modern technological world.

In the same manner, science used to be a

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slow growing pool of knowledge that has little by little made its way to a current exponential development.

Law and Science are arguably the most important sources of authority in societies. (Jasanoff, 2011) People have a natural inclination or bias to things proven by science or those which are covered by law. Science can be regarded as the ultimate source of human knowledge. It is through which we develop understanding of the world and how things go about. This developed knowledge have often served as basis for policy intervention in many modern societies. While science can often take a diversity of perspective, it is through policy-making which a societal response is imposed.

A certain level of harmony however is necessary for the marriage of these two institutions. Science is an essential input in policy making. (Biber, 2012) As science try to further boundaries and explore the uncharted. The law is likewise expected to regulate the new potential opened paths. This expectation when not met, results in legal blind spots and the weakness of the vanguard of justice. Maladaptive legalistic response is easily exploited. Many legal battles are lost because of the limited nature of the law and its specific application.

Unfortunately today's gap between the law and the sciences have been increasing. (Fort, 2010) Many legislators now are not familiar with the mainstream science that have been of great influence on how people live today. This results in a dilemma where the laws that they author no longer appeals to what is relevant to the public. The lack of awareness by many law makers also deprives them of an opportunity to be able to foresee possibilities for legislation.

### *1.2 The Philippine Law and Science*

In the Philippines, legally speaking the development of Science and Technology has long been encompassed in Republic Act No. 2067 otherwise known as the "Science Act of 1958". This was enacted to integrate, coordinate, and intensify Scientific and Technological research and development and to foster invention including allocation of funds and other purposes.

A Magna Carta for Scientist, Engineers, Researchers, and other Science and Technology

Personnel in the Government (RA No. 8439) have also been implemented in order to "maintain the necessary reservoir of talent and manpower that will sustain its drive for total science and technology mastery." This elaborates on the responsibility of the State to provide programs such as popularization of science culture, scholarships, improving science and engineering education, and granting incentives for pursuing careers in Science and Technology.

RA No. 10612 on the other hand provides a Scholarship coverage for students pursuing science, mathematics, and technology courses which hopefully translates to an ignited interest to teach these courses in the secondary education setting.

The Philippine laws, under RA No. 10055 further provides a stronghold for intellectual property to safeguard the ownership, management, use, and commercialization of generated knowledge research which in turn encourages invention, innovation and research development utilization.

However, even in the presence of such laws, scientific improvements in the Philippines are significantly slow. The laws, inasmuch as they are wonderfully written does not translate well into reality. While these law exist there is a consequent lack of political power to have the letters of the law materialize.

Additionally, while these laws in general provides for circumstances that would further science and technology, these remain silent in identifying the active role of S&T in the practice of law.

This retarded improvement has negative ramifications. There are technologies already enjoyed by other countries but remain theoretical here in the Philippines and this scientific lag in the global arena puts us in a disadvantage.

Locally speaking however, the lag of the law becomes relatively less apparent here in the Philippines. Amidst the new breakthroughs already available in other countries, we still lack access to many of the advancements that are already enjoyed by our counterparts abroad. In retrospect this has become beneficial for our country because the gap has not become as big as it should have been if Philippine Science has become at par with other countries.

Furthermore, we have yet to see a law which speaks of an integral nature of science and technology to justice administration. We are yet to see the law directly acknowledge the need for scientific knowledge in safeguarding the rights of people.

The nearest that we have probably gone is the case of *Oposa vs Factoran* [G.R. No. 101083] which fueled the doctrine of Intergenerational Responsibility on the environment in the Philippine legal system and probably the continuing legal debate on abortion. While law and science here are both present, the latter is the topic of contention and hence cannot be discounted.

A future is envisioned when the science becomes fully integrated with law not as a result of necessity but because of a synergistic relation that they can offer. This paper would like to examine the different relationship models of Science and the Law and identify the most appropriate relationship between the two.

## 2. METHODOLOGY

This is a descriptive study which will examine several models concerning science and technology in policy making including available laws that cover the same. It should analyze whether existing models and/or laws are still applicable in the current times by comparing and contrasting such models and contextualizing it with the movement of time.

Electronic database research was conducted with search terms including “Law and Science” as the take-off point. Limits were set to journal articles published after 2010. Interview with scientists involved with policy making and a political scientist was also done.

## 3. RESULTS AND DISCUSSION

Law and Science are previously two disjoint entities that has their own realm and field of specialty. One does not have anything to do with the other. Legislators and scientist alike have been making sure that they do not cross their boundaries.

The law was focused mainly on individual rights while science was focused on the production of knowledge and developing new technology. It was simpler back then when no apparent innovations have produce significant change in human behavior and lifestyle. Many breakthroughs are limited and are basic as we see it foundational in the current times.

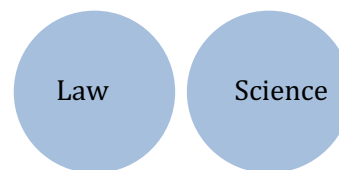


Fig. 1. The Disjoint Model of Science and the law.

However as the world develops, scientific breakthroughs have become a major driving force for law making at this day and age. The overlap between legal and scientific developments have become inevitable. These overlap opened up complexities brought about by the development in science and technology that were previously unregulated and were non-issues to the point that they become the juice of legislation.

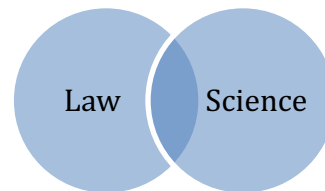


Fig. 2. The Interlocking Model of Science and Law

The steep incline in the availability of new scientific knowledge have posed significant difficulties for the law. Moses in 2007, identified four common legal problems brought about by the rapid and continued development in S&T which include: “(1) the potential need for laws to ban, restrict or, alternatively, encourage a new technology; (2) uncertainty in the application of existing legal rules to new practices; (3) the possible over-inclusiveness or under-inclusiveness of existing legal rules as

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applied to new practices; and (4) alleged obsolescence of existing legal rules.”

The continued progress of science is enabling for experts of law to better their policies in response to the rapidly evolving way of life as brought about by new scientific breakthroughs. When specific causations are identified applications in the law open up. (Sanders, 2009) Legal instruments and procedures have started to co-emerge with new materialized realities (Faulkner, 2012) brought about by continued development of science and technology.

Science and technology have the ability to enable new forms of conduct which may alter the means but lead to a similar end. (Moses, 2007). The cyberspace for example have previously been an uncharted field of the law. This was long after science has adequately realized that the cyberspace has become an authentic extension of the human being. The effect of cyber generated problems has been shown to be very real and the impact has been shown to be greater as compared to those done in the tangible world.

### *3.1 The Legal Lag*

Unfortunately, when the law fails to cover newfound ways, technological, and scientific means, the society opens up opportunities which can be exploited under the security blanket of having no governing law. This creates legal dilemma. Since criminals have a natural tendency to find ways to circumvent the law, they have been keeping in pace with the scientific and technological developments which are still not regulated by law.

While cases can become precedent and become sources of law, we eliminate the supposed deterring capacity of applicable laws if we fail to cover other possible, though futuristic, ways. Hence, Biber in 2012 suggested that “instead of attempting to separate science and policy out for every significant individual decision, we can make generalizations about how science and policy will

interact depending on the discipline that produces the relevant information.”

Jasanoff in 2005 have explicitly mentioned the importance of assuring that the rules generated by both law and science are able to travel beyond the specificities of the context in which they were articulated. While a prospective scientific take can easily be conceptualized, this is a lot more difficult and complicated to do when it comes to the letter of the law. Hence, a call for a more flexible legal structure shall also be heeded. Current laws should be able to accommodate new scientific and technological developments to at least minimize opportunities for ill acts.

The natural tendency is to legislate laws when there is already an existing problem. This is the reason why wrongdoers have been trying their best to circumvent the laws which we follow in strict letter. The principle of legality “*nullum crimen, nulla poena sine lege*” is an important reminder why there should be a prospective consideration in law-making.

When there is no law that covers an ill-act, then the government would have no power to punish that person however evil the act may be. This legal maxim is a notorious point of abuse for new crimes. This is also reason why new laws are enacted so that new crimes can be defined.

The cybercrime law is amongst the most recent addition to the newly defined crimes in the Philippines. Previously, ill acts that are done over the cyberspace are basically immune to lawsuits as there are no crimes defined over the platform. While some recourse were still afforded to those who were aggrieved, the punishment was not commensurate to the damage that has been afflicted to the victims.

This is why there is a need to have prospective coverage to laws in anticipation of the yet to be possible crimes as foreseen by science. The prospective insight provided by science should be utilized by the legislative branch as opportunity to avoid legal issues in the future. It should be realized

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that the response to an already existing problem eliminates the deterring nature of the law against wrongdoing. When the extent of law becomes wider, it would be more difficult for ill propagators to do their deed scot-free.

This however is easier said than done. Legal uncertainty creates a judicial dilemma. Being prospective also means having to settle with non-specifics. Thus, an active legal system is also encouraged to appropriately amend these laws. Nevertheless the prospective nature shall limit the areas where the law is silent. Although ambiguous its mere presence shall enable the judiciary to have jurisdiction over the issue and can therefore rule appropriately by the spirit of the law. When such is done the courts will not be left empty-handed.

In persons and family relations recent developments such as in-vitro fertilization is not yet clearly covered by the law. While this is being practiced already by many medical institution in the Philippines, adequate legal guidelines are not yet available, hence even the practice is also somewhat limited.

Computer and software development, medical breakthroughs, and even the development of new transportation methods have both challenged and helped the law in answering legal dilemmas.

The issue on abortion and the debate over where life begins has been adequately infiltrated by scientific perspectives. While Philippine law has yet to decide where to put the line. The contribution of the scientific community over this matter cannot be discounted. Even on matters of paternity and other medico legal cases, the use of scientific reasoning provide substantial authority which could aid in the resolution of a case.

Surgical and medical modifications including pathological conditions which alter sexuality as explained or developed by science has also introduced legal dilemmas. In *People vs Cagandahan* (G.R. No. 166676), a case of an intersex

individual applying for a change of gender, the court has been torn over the pathology of congenital adrenal hyperplasia and the female genotype XX. While science may look like the best arbiter for this case, it is the law only in deep understanding of science which has rendered the prevailing decision.

On the other end, not all technological advancements will require a new legislation. But all may be contributory to bigger legal issues such as that which will concern economy or labor movements. These improvements in science and technology are not that which opens new platforms or extension but rather when compounded results into a significant driving force that would require a change in laws.

According to Haack in 2009, “Both because of its concern for precedent, and because of the desideratum of finality, the legal system has a tendency to inertia, and sometimes lag[s] behind”. This is also supported by the Moses which even furthers by saying that improved statutory drafting techniques are inadequate to address the problem.

The lag in the development of new law amidst the rapid opening of new avenues offered by the development of S&T have brought about critical legal questions. Sadly, the unfortunate truth is that this is even more exaggerated in the Philippine setting where the legal system is a lot more complicated.

### *3.2 The Academe, Science, and Public Policy*

The scientific community in reality has very little interaction with policy-makers. Very few have been pro-active in involving themselves in acts beyond their laboratories. This is mainly because of the way we incentivize our knowledge producers. Most scientist in the Philippines are academe based. These institutions have long employed a publish or perish culture to drive scientist to continue their researches in order to contribute to knowledge development and the improvement of the research environment so that their respective universities

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become more appealing as an academic institution. Unfortunately, active involvement in policy making is not as well incentivized as research publications.

While it cannot be discounted that many science based policies have been well consulted with proper academic institutions, this paper contends that the academe which produces most of the knowledge have very little to nil influence in translating their research into public policy.


Even the academe seems to have difficulty in recognizing the marriage of both science and technology and the law. Dr. Rogel Mari Sese, an astrophysicist, and is currently involved in the Legislation of Philippine Space Agency and the Philippine Space Development and Utilization Policy, have had better hopes for academic institutions in terms of recognizing the impact of creating public policies over mere journal publications.

In fact, involvement of recognized scientists in the academe with policy-making are not given sufficient support and recognition. There remains to be a gap between scientific and policy making in the realm of the academe which as well should be obliterated.

Dr. Antonio Contreras, a political scientist have also mentioned that many universities have been too keen on journal publications so that they would be listed in world university rankings and have seemed to brush off socially relevant works that have direct public impact.

### *3.3 The Marriage*

Science and law should have more than just a mutualistic relationship. Like a married couple the two shall work hand in hand to better the society. The law should make sure that society puts premium on scientific improvements. In return, science should be able to adequately help policy-making bodies to better understand the new frontiers science has opened and how these can, and should, be regulated.



## Law and Science

Fig. 3. The Singularity Model of Law and Science

The close relationship of science to the law can help legislators to foresee possibilities which shall be regulated in advance. This could be an adaptation for the slow legislation in the country.

While this marriage may not be perfect, in harmony, both the law and science and technology, will improve. Science provides a very strong armamentarium which the Law can take advantage of. The insights and prospective reasoning is a strong suit of science which can aid legislators to be one step ahead of ill-deed-perpetuators

## 4. CONCLUSIONS

There is a need to harmonize the law with current scientific breakthroughs. Future research should dwell on how to effectively stipulate futuristic legal coverage on current laws. It shall work hand in hand by assuring that the law well provides for the development of science and technology while the latter tries its best to aid in the administration of justice by providing an armamentarium of scientific tool and resources for legal use.

The slow legal process shall be partly addressed by assuring that legislated policies are prospective and flexible for conceptualized avenues brought about by S&T. If new laws would be difficult to develop, there is a need to constantly update how existing law can be applicable in the recent practice in light of new scientific and technological development.

In the same manner, a strong support and political will through new legislations supporting S&T shall be prioritized Science can enable the law to see farther and hence shall be utilized by legislators. Awareness on the new breakthroughs in

science in technology shall be mandatory for law makers. The involvement of scientists in policy making shall also be given credence.

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