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## ABOUT US

The **International Journal of Digital and Data Law / Revue Internationale de droit des données et du numérique (RIDDN)** is an academic journal created and edited by Irène Bouhadana and William Gilles at IMODEV, the Institut du monde et du développement pour la bonne gouvernance publique.

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## **COPYRIGHT ON THE BLOCKCHAIN: SCARCITY AS INCENTIVE FOR PRODUCTION OR AS CONCENTRATION OF WEALTH**

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**P**rivate property generates wealth and preserves a necessary proportion of scarcity of assets. Although this is true for material assets, in the context of immaterial assets, especially for digital products, scarcity has been practically non-existent, as it is possible to copy and replicate at zero marginal cost. In this scenario, not just the monetary value drops or reduces significantly as the attribution of authorship also becomes difficult or non-existent, hindering creators' remuneration. The blockchain may redefine intellectual property enforcement. This paper analyzes this new kind of working space, where property rights may become incentives for production and economic development, or otherwise, another form of concentration of wealth and restrictions of access to culture and information.

Intellectual property law has struggled to catch up with technology. Digitally-driven business models revolutionized the way authors create, publish, share or trade their production on the internet, weakening the effectiveness of the law for securing and enforcing rights to intangible assets and intellectual production that are so necessary for the development of society.

This facilitated access to intellectual property does universalize knowledge, not only scientific, but also cultural, but it can also pose a risk to the viability of new creative processes, as it enables both paid and unpaid access to content. Authors seek incentives for production that, whether monetary or reputational, require authorship identification and enforcement of property rights.

This paper begins by exploring how private property is related to economic development, using an economic analysis of law approach, associating scarcity with the allocation of goods and its relation to efficiency.

Perhaps the solution to the dilemma between universalized access and fair remuneration to authors can be found in the new technologies. Therefore, this paper brings some information about blockchain technology that, due to its characteristics, may be problem-solving. Although legal and economic institutions that are prior to blockchain must provide guidelines so that this

technology can be used to balance efforts and reward, maximizing incentives for productivity, but also ensuring fair competition and protection of public interest.

Some of these institutions are analyzed in this paper, raising questions – and maybe some answers – about means and purposes of copyright protection in the blockchain era.

## § 1 – PRIVATE PROPERTY FOR ECONOMIC DEVELOPMENT

“He who has no hope that he shall reap, will not take the trouble to sow.”<sup>1</sup> Private property ensures the owner’s right to use a good or asset for consumption and/or income generation (use rights of the property).<sup>2</sup>

When it comes to economic activity, agents seek to maximize their payoffs, so viewing private property as an incentive or a reward for productivity puts it in a central position in the economic development process. Therefore, private property, as a legal and economic institution, fulfills not only individual needs, but also important social functions. Active production is conducive to human development.

North defines poverty as a result of institutional constraints that define a set of payoffs to political or economic activity that do not encourage productive activity.<sup>3</sup>

In this sense, efforts and labour are intrinsically related to private property. John Locke<sup>4</sup> explored this idea as summed up: “[...] labour adds to nature something which unquestionably belongs to the labourer, things are mixed, so to say, with his labour, and hence become his property.”<sup>5</sup> Later, Adam Smith elucidated the concept that “the property which every man has in his own labour, as it is the original foundation of all other property, so it is the most sacred and inviolable”<sup>6</sup>, and John Stuart Mill emphasized that property must be granted when “produced by their own exertions, or received either by gift or by fair agreement, without force or fraud, from those who produced it.”<sup>7</sup>

So, use rights of the property owner are the broadest right to use things for economic purposes, directly or indirectly. The owner has the faculty to use, to perceive profits and to choose the

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<sup>1</sup> J. BENTHAM, “Manual of Political Economy”, in J. BOWRING (ed.) *The Writings of Jeremy Bentham*, vol. 3. Edinburgh: W. Tait, 1843, p. 71.

<sup>2</sup> T. BESLEY, M. GATHAK, “Property Rights and Economic Development”, in D. RODRIK, M. ROSENZWEIG (Eds.), *Handbook of Development Economics* (eds), Vol. 5. North-Holland, Elsevier, 2010, p. 3.

<sup>3</sup> D. NORTH, *Institutions, Institutional Change and Economic Performance*, Cambridge, Cambridge University Press, 1990, p. 110.

<sup>4</sup> J. LOCKE, “Political writings”. D. WOOTTON (Ed.). Hackett publishing co, inc. 1993.

<sup>5</sup> J. GRONOW, “John Locke, Adam Smith and Karl Marx’s Critique of Private Property”, in J. GRONOW (ed.), *On the Formation of Marxism*, Series: Historical Materialism Book Series, vol. 113. Brill Online, January 1st, 2016, p. 226.

<sup>6</sup> A. SMITH, *The Wealth of Nations*, Books IV-V, London, Penguin Books, 1999, p. 138.

<sup>7</sup> J. S. MILL, “A System of Logic”, in J. ROBSON (ed.), *Collected Works of John Stuart Mill*, Toronto, Toronto University Press, 1969, p. 218.



purpose and destination suited for it.<sup>8</sup> This extension of rights applies not only to tangible assets, but also for intangible assets and intellectual production, as the creator or the producer has the right to earn profits from what was created, published and made available to trade.

This is justified and thus legitimized by the concept of maximizing efficiency, which is a condition for economic development. By creating exclusivity over certain goods or assets, which are scarce, and defining property ownership, two main benefits arise: (i) it is less likely that the good will be underused; and (ii) preventing the tragedy of the commons.<sup>9 10</sup> Effort-reward balance is established, moreover private property optimizes the allocation of rights.

Maximizing wealth depends on maximizing the added value of all goods and services, given that *value* is determined by how much the owner would accept in order to sell it, or by how much a buyer would be willing to pay to purchase it – whichever is greater on a well-functioning market.<sup>11</sup>

On this matter, the concepts of Pareto or Kaldor-Hicks efficiency can be applied for better understanding. Marcia Carla Pereira Ribeiro e Irineu Galeski explain that in Pareto efficiency goods are transferred from those who value them least to those who value them most, in an exchange where an individual can have his or her situation improved, without worsening the conditions and situation of any other.<sup>12</sup> While Kaldor-Hicks criterion is based on the premise that any economic or rights re-allocation is considered improved if those that are made better off can somehow compensate the ones that are made worse off, so that the total earnings outweigh any losses eventually suffered by some individuals.

Private property, in this sense, is an instrument for efficient use and reallocation of resources, especially the scarce ones. The Kaldor-Hicks criterion explains that eventual losses for some individuals, arising from the absence of distributive or equitable aspects of private property, are compensated by social gains, legitimizing this fundamental institution for development. Therefore, private property must be enforced by a proper legal framework as an incentive for productivity.<sup>13</sup>

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<sup>8</sup> O. GOMES, *Contratos*, Rio de Janeiro, Forense, 1995, p. 86.

<sup>9</sup> E. AGOSTINHO, “As tragédias dos comuns e dos anticomuns”, in M. C. P. RIBEIRO, V. KLEIN (eds), *O que é Análise Econômica do Direito – uma introdução*. Belo Horizonte, Fórum, 2011, 49-61.

<sup>10</sup> G. HARDIN, “The Tragedy of the Commons”, *Science Mag*, vol. 162, issue 3859, Dec. 1968, pp. 1243-1248.

<sup>11</sup> W. LANDES, R. POSNER, “The Economic Structure of Tort Law”, Cambridge, Harvard University Press, 1987.

<sup>12</sup> M. C. P. RIBEIRO, I. GALESKI JUNIOR, *Teoria Geral dos Contratos - Contratos Empresariais e Análise Econômica*. Rio de Janeiro, Elsevier. 2009, p.86.

<sup>13</sup> R. COOTER, T. ULEN, *Direito & Economia*, Tradução de Luiz Marcos Sander e Francisco Araújo da Costa, 5th edition, Porto Alegre: Bookman, 2010, p. 90.

New Institutional Economics<sup>14</sup> puts property rights as a central element of the institutional structure of economy, being one of the foundations of markets, trade and development. Institutions form the incentives structure in a society and, therefore, are determinant for the economic performance. Cooter and Ulen work with the idea of creating incentives to use resources in a more efficient way, given that effective use of resources maximizes the nation's wealth.<sup>15</sup>

North and Thomas<sup>16</sup> assert that efficient economic organization needs the establishment of institutional arrangements and property rights that create an incentive to channel individual economic effort into activities that bring the private rate of return close to the social rate of return. Thus, economic development entails having credible enforcement of property rights.

## § 2 – CHALLENGES FOR DIGITAL PRODUCTS

Property rights have different frameworks and effects when considering if related to tangible or intangible assets. Tangible assets, by their very nature, are subject to the principle of rivalry. That is, when someone uses the good, in principle, is not possible for someone else to use it under the same conditions and at the same time. Intangible assets, on the other hand, don't necessarily have these limitations since anyone who can reproduce it can make use of it, even if there are multiple users at the same time and under the same conditions.

For intangible assets, the principle of non-rivalry applies. Therefore, giving an example, if someone is not allowed to make use of a trademark created by someone else because of a registration that was granted to this person, it is because there is a right of exclusivity to the property holder.

It is undeniable that development cannot be detached from innovation, and that innovation depends on creating and making new products and services available to the market. The process of innovation needs to be stimulated not only by rewards from the market, but also by the conditions in the process of creation. In the case of a patent for invention, not only the goods produced from the innovation, but also the inventor's intellectual rights need to be protected.

Therefore, it is costly to produce, to invent and to create. But it is absolutely necessary to do so in order to maximize wealth. For Cooter & Schafer<sup>17</sup> agree that economic development is enhanced

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<sup>14</sup> D. NORTH, *Institutions, Institutional Change and Economic Performance*, Cambridge, Cambridge University Press, 1990.

<sup>15</sup> R. COOTER, T. ULEN, *Law and Economics*, 6th edition, Berkeley Law Books, Book 2, 2016, p. 74.

<sup>16</sup> D. NORTH, R. THOMAS, *The Rise of the Western World – A New Economic History*, New York, Cambridge University Press, 1973, p. 1.

<sup>17</sup> R. COOTER, H. SCHAFER, *O Nó de Salomão – Como o Direito Pode Erradicar a Pobreza das Nações*, Tradução de Magnum Eltz, Curitiba, CRV, 2017, p.11.



through innovations. This is intrinsically related to intellectual production and demands reliability.

In this case, incentives come in the form of intellectual property. For copyright owners, the ability to exclude others from unauthorized access to their works is crucial to their profitability, ensuring that remuneration compensates and, even more, rewards for all the resources invested in the production.

However, the greatest challenge for intangible assets is the lack of scarcity of the products available for use or purchase. It is possible for several agents to simultaneously use an intangible asset without interfering with each other, and without the product running out.<sup>18</sup> And this became even harder as the internet and the World Wide Web gained ground spreading the culture of *copy and paste*, intensified on the Fourth Industrial Revolution context.<sup>19</sup>

Furthermore, all kinds of intellectual production are now available as digital products. They were either created as digital products or were transferred to the digital world to be part of this market sphere.

As a result, digitally-driven business models revolutionized the way authors create, publish, share or trade their production on the internet. It is so much easier to market a product worldwide where borders have become virtually non-existent, and this is really appealing for authors. Although, the possibility to replicate at lower or even zero marginal cost and the facilities to anonymize and plagiarize works on the internet, not just reduces significantly the monetary value of the products, but also the attribution of authorship becomes difficult or non-existent, hindering creators' remuneration.

Intangible assets usually demand high initial investment as intellectual capital measured by education, on-the-job training, research and development expenditures, among others<sup>20</sup>, and markets depend on private property rights that are stable, well defined and well enforced, so that it can be also fairly priced. There are few incentives for intellectual progress when there is no ownership and it is difficult to monetize and profit from the products.

As Demsetz<sup>21</sup> explains, "if a new idea is freely appropriable by all, if there exist communal rights to new ideas, incentives for developing such ideas will be lacking. The benefits derivable from these ideas will not be concentrated on their originators", but with some degree of private rights to the originators, these ideas

<sup>18</sup> M.C. P. RIBEIRO, et al., "Direitos Autorais e Música - Tecnologia, Direito e Regulação", *Rev. Bras. Polit. Públicas, Brasília*, vol. 7, No. 3, p. 511-537, 2017, p. 515.

<sup>19</sup> K. SCHWAB, *A Quarta Revolução Industrial*. Tradução de Daniel Moreira Miranda. São Paulo: Edipro, 2016, p. 13.

<sup>20</sup> J. COHEN, *Intangible Assets - Valuation and Economic Benefit*. John Wiley & Sons Inc., Hoboken, New Jersey, 2005, p. 31.

<sup>21</sup> H. DEMSETZ, *Toward a Theory of Property Rights*. The American Economic Review, vol. 57, no. 2, Papers and Proceedings of the Seventy-ninth Annual Meeting of the American Economic Association, pp. 347-359, May, 1967, p. 359.

will come forth at a more rapid pace. Although the author affirms that the existence of the private rights “does not mean that their effects on the property of others will be directly taken into account”<sup>22</sup>, as a new idea makes an old one obsolete and another old one more valuable, and these effects will not be directly taken into account, but they can be called to the attention of the originator of the new idea through market negotiations.

Bentham<sup>23</sup> bases on the principle of utility, which states that the merit of an action is determined solely on the basis of how beneficial it tends to be to all those it will affect. Intellectual production is beneficial for the whole society, so the authors reward is based on merit and utility, and has to be proportional to the benefits it creates. Otherwise, copyright protection could be exacerbated to the point where the incentives structure would turn into a constraints structure. It is a cost-benefit analysis. For Bentham<sup>24</sup>, if the reward is too low, not enough people will undertake that activity, or will perform that work to a merely acceptable level.

On a Law and Economics approach, authorship and intellectual property rights enable the most efficient use and allocation of resources, as previously explained. On a New Institutional Economics approach, intellectual property is an institution that must be combined with other political and economic institutions – considering, for instance, means and terms for the copyright protection – creating an optimal-efficient arrangement of institutions to boost development.

### § 3 – BLOCKCHAIN FOR INTELLECTUAL PROPERTY ENFORCEMENT

With the advent of the digitalization, enormous quantities of copyrighted material became readily available to anyone.<sup>25</sup> So, the internet has democratized access to various content, but also increased copyright infringement, as widespread access to intellectual property includes unauthorized or improper access to creations.

The greatest challenge is to find the means to oversee, control and regulate use and abuse of copyrighted digital products. On this matter, blockchain is a promising technology as it is supposed to record and track access and use of anything of value in a transparent and safe system – a distributed trust network, or, as

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<sup>22</sup> Ibidem, p. 359.

<sup>23</sup> J. BENTHAM, “An Introduction to the Principles of Morals and Legislation”, in J. BURNS, L. HART (eds.), *The Collected Works of Jeremy Bentham*, London, The Athlone Press, 1970.

<sup>24</sup> J. BENTHAM, “Manual of Political Economy”, in J. BOWRING (ed.) *The Writings of Jeremy Bentham*, Vol. 3. Edinburgh: W. Tait, 1843.

<sup>25</sup> J. COHEN, *Intangible Assets – Valuation and Economic Benefit*, John Wiley & Sons Inc., Hoboken, New Jersey, 2005, p. 15.

Davidson, De Filippi and Potts<sup>26</sup> conceptualize it, a “distributed ledger technology”.

Internet has enabled many positive changes, but it has serious risks for business and economic activities. Under the first generation of the internet, many creators of intellectual property did not receive proper compensation for it.<sup>27</sup>

However, blockchain is a new digital ledger of economic transactions that can be programmed to record virtually everything of value and importance for humankind, for example: certificates, licenses, financial accounts and anything that can be expressed in code, including, for the purpose of the present paper, titles of ownership of intellectual property. “We can ensure that creators are compensated for their intellectual property [...] Every cultural industry is up for disruption and the promise is that creators get fully compensated for the value they create.”<sup>28</sup> That is because rights can be recorded on the blockchain so that the rights holder cannot be violated.

Urban and Pineda describe blockchain technology as a digital ledger that lists the ownership of a set of assets and an essentially tamper-proof transaction history for those assets: “Blockchains are operated by a peer-to-peer (P2P) network of computers in which each of the computers that form a node on the network independently maintains a complete copy of the ledger”<sup>29</sup>, and because every transaction is recorded on the blockchain, it is possible to trace the entire transaction history.

The authors assert that blockchain offers significant innovations in terms of organizing and coordinating information systems and tracking a variety of assets with integrity and reliability of the information recorded on it, that enable greater efficiency and decentralization which could help secure greater privacy and a more even distribution of economic and social power.<sup>30</sup>

As Zylbersztajn & Sztajn<sup>31</sup> clarify, better defined property rights generates less transaction costs. If the owners and their rights are predefined, there will be greater welfare for a larger number of individuals, because in general the benefits will be greater than the losses, arising from greater marginal utility.

Even if the author seeks only reputation as a reward for intellectual production, there is a need for authorship to be well defined and protected. Blockchain provides means of proving the authorship, ownership and preserving records.

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<sup>26</sup> S. DAVIDSON, et al. *Disrupting Governance - The New Institutional Economics of Distributed Ledger Technology*. July 19, 2016.

<sup>27</sup> D. TAPSCOTT, A. TAPSCOTT. *Blockchain Revolution*. New York, Portfolio Penguin, 2016, p.21.

<sup>28</sup> Ibidem, p.14.

<sup>29</sup> M. URBAN, D. PINEDA, *Inside the Black Blocks - A Policymaker's Introduction to Blockchain, Distributed Ledger Technology and the "Internet of Value"*. Mowat Centre. Munk School of Global Affairs & Public Policy. Mowat Research #168, August, 2018, p. 8.

<sup>30</sup> Ibidem, pp. 2-3.

<sup>31</sup> D. ZYLBERSZTAJN, R. SZTAJN. “Law and Economics”, in D. ZYLBERSZTAJN, R. SZTAJN (eds.), *Direito e Economia - Análise Econômica do Direito e das Organizações*, Rio de Janeiro, Elsevier, 2005, p.76.

Tapscott & Tapscott explain how it works: “A smart contract provides a means for assigning usage rights to another party [...] The code of the contract could include the term or duration of the assignment, the magnitude of royalties [...] and some triggers for terminating the contract”<sup>32</sup>, when the access to the work registered on the blockchain would no longer be permitted.

A wide variety of business models can be created from this technology, and the author can decide for the one he or she finds most viable or profitable. A video or a song, for example, may be restricted to be reproduced by only one user at a time; or perhaps the first reproduction of a video or song for a user is free, but subsequent reproductions must be paid for. And so on, scarcity becomes an attribute that can be shaped as needed, or according to the author's creativity.

It is clear that blockchain, so far, does not change the institutions of private property. It is itself a groundbreaking institution for ensuring contractual compliance and enforcement on property rights, alongside being a tool for greater efficiency on digitally-driven markets, focusing on blockchains as a new form of governance. “In this governance centred view, blockchains compete with firms, markets and economies, as institutional alternatives for coordinating the economic actions of groups of people”.<sup>33</sup>

Blockchain economizes transactions costs – as transactions costs are explained by Williamson<sup>34</sup> – of monitoring and enforcing intellectual property rights, mitigating opportunism. Therefore, from the perspective of New Institutional Economics, blockchain helps to create a more efficient institutional arrangement.

#### § 4 – INCENTIVE FOR PRODUCTION OR CONCENTRATION OF WEALTH?

Intellectual and creative progress are of public interest but had been threatened by the difficulty of enforcement of intellectual property rights on the internet, which was caused by abusive access to copyrighted digital products.

Clearly, access to information, knowledge, culture, education, and content on research and development are all of relevant public interest<sup>35</sup>, but, in analogy to the tragedy of the commons<sup>36</sup>, it cannot hinder incentives for further production. Whether

<sup>32</sup> D. TAPSCOTT, A. TAPSCOTT. *Blockchain Revolution*. New York, Portfolio Penguin, 2016, p.47.

<sup>33</sup> S. DAVIDSON, et al. *Disrupting Governance - The New Institutional Economics of Distributed Ledger Technology*. July 19, 2016, p.3.

<sup>34</sup> “Transaction costs are the economic equivalent of friction in physical systems.” O. WILLIAMSON, *The Economic Institutions of Capitalism*. New York, The Free Press, 1985, p.19.

<sup>35</sup> M.C. P. RIBEIRO, et al. *Direitos Autorais e Música - Tecnologia, Direito e Regulação*. Rev. Bras. Polít. Públicas, Brasília, v. 7, n 3, p.511-537, 2017, p.519.

<sup>36</sup> G. HARDIN, “The Tragedy of the Commons”, *Science Mag*, vol. 162, issue 3859, Dec. 1968, pp. 1243-1248.

monetary or reputational, these incentives require authorship identification and enforcement of property rights.

If the institutions of ownership on blockchain are indeed transparent and enforceable, is this technology a step forward?

Property rights have the potential to generate wealth by incentives for production, but not surely to distribute wealth. The first generation of internet, before blockchain, turned out to be a concentration of few powerful corporations and platforms that dominate markets<sup>3738</sup>, resulting in even greater concentration of wealth. “Despite the promise of a peer-to-peer empowered world, the economic and political benefits have proven to be asymmetrical – with power and prosperity channeled to those who already have it.”<sup>39</sup>

Is blockchain a chance to do things differently? New technologies not only modify what we do, but how we do it.<sup>40</sup> If it is certain that private property is a central element of markets, for generating wealth and economic development, it is established that the protection of property is something that must be done. But the blockchain opens up a range of possibilities on how to do it, as scarcity and enforcement can be shaped using this technology. The issues that emerge involve making decisions about the criteria that will be used to define how long, for what purposes, and for whom a particular product will be scarce. This decision cannot be limited solely to profitability aspects and business models, given that there is a relevant public interest in accessing intellectual production.

It is still early to identify advantages and disadvantages, but by the premises of New Institutional Economics, it will depend on the arrangements with other institutions.<sup>41</sup>

Economic activities evolve over time, business models are constantly changing, so property rights’ institutions, both formal and informal, may need a reappraisal to ensure that their purpose of efficiency and development is being fulfilled.

Cooter & Ulen affirm that patents and copyright are temporary monopolies that can vary in breadth and duration, and narrowing the breadth or shortening the duration of intellectual property rights often decreases monopoly profits and increases dissemination; on the other hand, broadening the scope or duration of the creator’s property rights increases monopoly

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<sup>37</sup> D. TAPSCOTT, A. TAPSCOTT. *Blockchain Revolution*. New York, Portfolio Penguin, 2016.

<sup>38</sup> M.C. P. RIBEIRO, et al., “Direitos Autorais e Música - Tecnologia, Direito e Regulação”, *Rev. Bras. Polít. Públicas*, Brasília, v. 7, n 3, p.511-537, 2017, p. 514.

<sup>39</sup> D. TAPSCOTT, A. TAPSCOTT. *Blockchain Revolution*. New York, Portfolio Penguin, 2016, p. 4.

<sup>40</sup> K. SCHWAB, *A Quarta Revolução Industrial*. Tradução de Daniel Moreira Miranda. São Paulo: Edipro, 2016, p. 13.

<sup>41</sup> D. NORTH, *Institutions, Institutional Change and Economic Performance*, Cambridge: Cambridge University Press, 1990.



power, which rewards creation and reduces dissemination. Thus, “incentives for creation and dissemination trade off.”<sup>42</sup>

Adam Smith<sup>43</sup> recognized that a limited monopoly, such as that granted by a patent or copyright, can serve as an appropriate reward for costly and risky endeavors. Those limitations are called *user rights*, and they exist to provide a balance in copyright, preventing market failures such as unfair market power leverage.<sup>44</sup> They come in the form of freedom of speech, equality of access, time limits, and, on some cases, the permission to use copyrighted content for non-commercial purposes. These rights and exceptions must be regulated and enforced in the online environment. Copyrights maximize incentives for productivity, and exceptions favour competition and public interest.

Internet created an unprecedented scenario with exponential content creation, including collaborative creation, but failed to enforce copyrights. Blockchain presents another opportunity to find the much needed effort-reward balance, as long as the institutional arrangements reappraise and define how and when to limit the rights. Leaders of this new distributed paradigm will need to stake their claim and unleash a wave of economic and institutional innovation, to ensure this time that the promise is fulfilled.<sup>45</sup>

Tapscott & Tapscott<sup>46</sup> warn that in the advent of the internet there was much hope and optimism that it would help with the inclusion of developing world citizens in the global economy, but instead economic power has gotten more concentrated and entrenched as fewer entities use the internet to control and acquire more wealth – not to mention the risk of regulatory capture. So, there are reasons for concerning if blockchain is going down that same path. Not just individuals, but also countries in differing stages of economic development must be granted access to knowledge. Perhaps, a *one size fits all* should not apply for copyright regulation in the blockchain era, in a globalized but unequal world.

Zingales<sup>47</sup> clarifies that certain levels of inequality are essential for competition, for the healthy functioning of markets, and thus for development. However, even inequality needs to be considered

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<sup>42</sup> R. COOTER, T. ULEN, *Law and Economics*. 6th Edition. Berkeley Law Books. Book 2, 2016, p. 117.

<sup>43</sup> A. SMITH, *The Wealth of Nations*, Books IV-V. London: Penguin Books, 1999, p. 343.

<sup>44</sup> R. DREYFUSS, et al. *Expanding the Boundaries of Intellectual Property - Innovation Policy for the Knowledge Society*. Oxford University Press, May 24th 2001.

<sup>45</sup> D. TAPSCOTT, A. TAPSCOTT. *Blockchain Revolution*. New York, Portfolio Penguin, 2016, p. 25.

<sup>46</sup> Ibidem, pp. 12-13.

<sup>47</sup> L. ZINGALES, *Um Capitalismo para o Povo - Reencontrando a Chave da Prosperidade Americana*, Tradução de Augusto Pacheco Calil, São Paulo, BEI Comunicação, 2015, p. 13.



fair by most of the people affected by it, and thus, as Bentham<sup>48</sup> explains, it must be supported by merits.

Whether considering blockchain as a tool, or incorporating it as a new institution, prior legal and economic institutions are the ones to provide guidelines so that this technology can be a new way of pursuing a long date goal, that is, efficiently protecting copyright as part of economic development, with equitable distribution of social benefits, in balance with private interests.

## CONCLUSION

Whether it is from a deontological perspective, such as Lockean labour and effort theory, or from a utilitarian perspective, that considers the social and economic impacts originated by an incentive-based system; safeguarding property rights have undeniable positive effects. Ownership guides the behavior of agents towards the conservation of their goods and the most efficient use of it.

Regarding intellectual property, recognizing authorship and ownership is not associated with aspects of material scarcity or rivalry in use. It is a privilege granted by the law. The right of exclusivity on the use of an intellectual property fulfills the purpose of inducing creation and innovation, from the perspective of a fair remuneration.

The diffusion of internet, while providing universalized access to information and data, also made it difficult or even impossible to properly remunerate the authors.

This paper aimed to raise questions and intrigue about the potential effects of blockchain technology to overcome the dilemma that is established between universalized access to knowledge and fair remuneration of the creators.

This depends on the structure and strength of formal and informal institutions when it comes to social and economic development, especially because it is a globalized but unequal world. Different stages of development should be respected in order to establish efficient levels of copyright protection, balancing private interests and social benefits.

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<sup>48</sup> J. BENTHAM, “An Introduction to the Principles of Morals and Legislation”, in J. BURNS, L. HART (eds.), *The Collected Works of Jeremy Bentham*, London: The Athlone Press, 1970.

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