Licensing for Good: Social Responsibility in the University-Industry Technology Transfer Process

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***Abstract*--Universities are increasingly endowed with the responsibilities of addressing social problems and partaking in the creation of a sustainable future. Teaching, research, and social engagement must be complemented with the successful transference of technologies from academia to markets. As universities re-envision their position in society and embark in new approaches to tackle social and environmental challenges, supporting interdisciplinary collaborations, designing programs with experiential components, and priming social relevance across all of their endeavors, they cannot forget the role of the university-industry technology transfer process in spreading innovation and securing social value creation. This is particularly relevant for technologies with a potential for environmental or social impact and those funded with federal grants. University Technology Transfer Offices (UTTOs) should make use of licensing terms and practices ensuring that the technologies under their purview reach the market and realize both their financial and social potential. In this study, drawing from literature on corporate social responsibility and university licensing, we evaluate the strategy and social responsibilities of universities when licensing their technologies, and provide guidelines on licensing practices that are aligned with the pursuit of profit and the enabling of social value.**

I. INTRODUCTION

Social responsibility is permeating the mission of universities, and business schools are the main mediators of their interaction with business stakeholders and the broad community. The 2013 standards of the Association to Advance Collegiate Schools of Business [1] are sparking a shift in how business schools engage with their communities and the business world. Under the tagline "*Engagement, Innovation, Impact*," the current guidelines identify how society is pulling from businesses in responsibility matters:

> *"The business environment is undergoing profound changes, spurred by powerful demographic shifts, global economic forces, and emerging technologies. At the same time, society is increasingly demanding that companies become more accountable for their actions, exhibit a greater sense of social responsibility, and embrace more sustainable practices."* [1, p. 2].

AACSB also articulates the need for universities—and business schools—to show commitment to issues of corporate social responsibility:

> *"The school must demonstrate a commitment to address, engage, and respond to current and emerging corporate social responsibility issues (e.g., diversity, sustainable development, environmental sustainability, and globalization of economic activity across cultures) through its policies, procedures, curricula, research, and/or outreach activities."* [1, p. 6].

Similarly, the European Foundation for Management Development's EQUIS accreditation of management education lists among its criteria ethics, responsibility and sustainability [14], and calls for "business schools to contribute to the resolution of societal challenges and to act as 'good citizens' in the environment they operate in." [14, p. 6].

Business schools—and universities in general—engage in corporate social responsibility[1] (CSR) by teaching courses, taking action in their communities, and creating research programs aiming to solve social and environmental problems. Many business schools show commitment to social and ethical issues, although top-tier schools offer a more proactive education on CSR issues, engaging with stakeholders in training, research, and community programs with relevant CSR objectives [11]. This deeper level of action is closer to civic engagement [7], and identifies the active role of faculty members in crafting experiential learning and research with the community. We identify the different CSR roles adopted by business schools and their parent institutions in Figure 1.

[1] We use the term corporate social responsibility in a broad sense, as the balance of economic, social and environmental responsibilities to meet present needs without compromising the ability of future generations to meet their own.

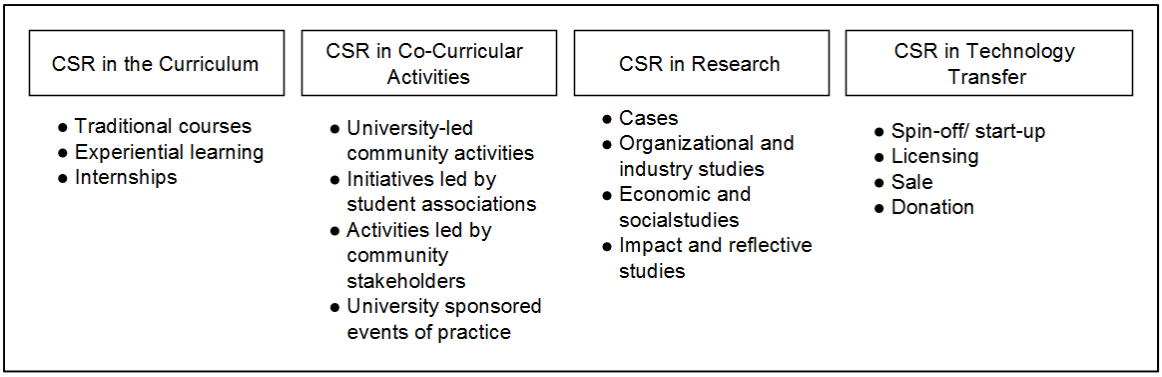

Figure 1. Facets of CSR in universities.

While CSR in teaching and co-curricular activities is standard practice in most universities, only those that are proactive in the teaching of CSR count with faculty and student engagement and commitment to sustainability [8, 11]. This exemplar engagement, frequently involving faculty research on CSR, makes curricular and co-curricular CSR activities truly at par with the business needs of ethical leaders and with the scope of sustainability challenges faced by humankind [12].

Technology transfer seems a particularly relevant element of CSR commitment that few discuss, despite the enormous impact that universities have in pacing the progress of global innovation, development, and social welfare.

In the United States, The Bayh-Dole Act of 1980 permits universities and federally funded research programs to retain title to their inventions. The universities are to follow a few conditions, including disclosing the invention to the federal government, informing the government on intention to patent and providing updates upon request, retaining title of the invention, sharing licensing proceeds with the inventors, and using the balance of licensing income to support scientific research or education [13].

The introduction of the Bayh-Dole Act led to the creation of numerous technology transfer offices (TTOs) across US universities to pursue the commercialization of innovations originating from federally funded research, the primary source of research funding at most U.S. universities [10, 31]. As de Larena argues [13], the Act spurred collaboration between industry and university, but it has also led to the zealous over-patenting, frequently in early stage of development of the technology, due to the moral hazard established in the Act [13].

There is a plethora of contractual forms TTOs can use to engage with industry, from agreements on sponsored research and options on intellectual property, to material transfer agreements and licenses [5]. In addition, universities may opt to allow or support the spinning off of new companies to further develop, protect and commercialize the innovations. Under any of those forms, the TTO has the responsibility to pursue monetization strategies that embody their technology transfer strategies and policies [18].

The timing and terms of the license agreement put forward by the TTO may have great consequences not only on the revenue an invention generates, but on its social impact. Universities wanting to reach a comprehensive CSR strategy well infused in all the activities of the institution should not ignore the important role their TTOs play in generating social value and technology-based economic development (TBED).

II. LITERATURE REVIEW

A comparatively small number of articles address the social consequences of IP protection and technology licensing in the university setting. Medical inventions, because of their eminent impact on social welfare, are frequently the focus of articles in the topic.

Probably the most widely discussed case in the literature has been the exclusive license of a patent issued and assigned to John Hopkins University in 1990, with application in the treatment of cancer. John Hopkins University granted an exclusive license of the patent to Becton-Dickinson & Company, and the latter an exclusive sublicense to Baxter. According to Bar-Shalom and Cook-Deegan, the patent—broader in its assertions than the science of the invention would bestow—allowed Baxter to suit and kill its competition, a small biotech startup called CellPro with a product in the market of its own invention [24], increasing Baxter's benefits [3]. John Hopkins University has been criticized for the exclusive license to the life-saving patent, a decision not taken in the public interest [20]. The research leading to John Hopkin's discovery was publically funded, while the National Institutes of Health articulates the goal of technology transfer is "to disseminate knowledge and to rapidly incorporate biomedical research into medical applications" [30], which clearly disagrees with the actions of the university.

The literature also proposes licensing approaches to solve the problem of medical inventions not living up to their full social potential. The researchers Kapczynski, Chaifetz and Benkler raise the issue that universities in the US can address access to medical inventions and R&D gaps by "changing

their licensing practices" [25, p. 8]. They suggest universities make use of the Equitable Access License, which uses proprietary rights "to ensure the right of third parties to access and distribute the innovation and its derivative products" [25, p. 59].

Fair [16] reflects on the problem of the high cost of patented green technologies, limiting their adoption and the much-needed relief on reducing our impact on the environment. The article evaluates the ramifications of enforcing compulsory licenses for green technologies and arrives at the conclusion that alternative methods to ensure the market diffusion of green technologies, such as pricing schemes that take into account the resources and need of the licensee, are a more feasible approach than compulsory licensing.

The literature also presents general arguments about the responsibility of universities attending to the nature and mission of the academic institution. Universities' tax-exempt status has implications for how they manage their IP [36], as they exist to provide "a public benefit—a benefit which the society or the community may not itself choose or be able to provide, or which supplements or advances the work of public institutions already supported by tax revenues'' [6]. A second related argument in favor of the social responsibility of universities and research centers licensing their patents attends to their use of federal funds (e.g., see [26] for a complete reflection on how patents of federally funded research could have ameliorated the AIDS epidemic in developing countries); and even call for an amendment to the Bayh-Dole statute to "ensure accountability and feedback on how inventions arising in federally funded research are licensed" [3, p. 662].

Another argument in favor of universities' engorging their social responsibility appeals to academic norms and the moral responsibility of supporting equity and sustainability, serving as referents, and contributing to the innovation system [32]. Bar-Shalom and Cook-Deegan clearly summarize this position:

> *"Students and faculty at academic research institutions, and donors who contribute to them, may view some university behavior in pursuit of technology licensing as conflicting with academic norms. […] Technology licensing offices may need to consult with, or at least consider more carefully, the academic norms of their institutions in addition to the revenue they generate and the business interests of their licensees."* [3, p. 661].

III. SOCIAL MISSION OF TECHNOLOGY TRANSFER OFFICES

The university-industry technology transfer process should be an accepted facet of universities' commitment to social responsibility. Three arguments have been discussed so far in support of the universities paying attention to social interests when licensing their technologies: they use federal funds; they enjoy tax-free status, and are consequently expected to act for public benefit; and they have a moral responsibility toward society.

We propose an additional argument in support of grounding university licensing in CSR: licensing following a model inclusive of social welfare would generate synergistic effects in the market and increase returns for universities, particularly if the current organizational structures under which licensing take place are re-envisioned.

Among those universities reporting to the Association of University Technology Managers (AUTM), the top 10 in terms of federal research expenditure (Figure 1) spent a total of $56.57 billion dollars from federal sources in the period 2010-2014 period. Their average return on research expenditure from licenses was 2.62% (2010-2014) [2]. In that same period, the group presented in Table 1 reported executing 1,564 exclusive licenses or options [2].

TABLE 1. TOP 10 AUTM-REPORTING UNIVERSITIES IN TERMS OF FEDERAL RESEARCH EXPENDITURES, 2010-2014 [2]

Univ. of California System
Massachusetts Inst. of Technology (MIT)
Johns Hopkins Univ.
Univ. of Michigan
Univ. of Pennsylvania
Univ. of Washington/Wash. Res. Fdn.
Johns Hopkins University
Univ. of Pittsburgh
Johns Hopkins Univ. Applied Physics Laboratory
University of Texas System

Although the link between CSR and the financial performance of universities in licensing markets has not been studied, given the firm-like nature of the TTOs' operations it is reasonable to expect the same positive association between CSR and financial performance found in private firms (e.g., [9, 35]). Detailed analyses of the CSR-performance link may also find that licensee satisfaction and the innovativeness of the university mediate the relationship between CSR and licensing performance, similarly to findings reported in the literature studying private companies [28].

When it comes to CSR, the technology transfer process suffers from deficiencies explained by Agency Theory [21]. Multiple problems arise due to the authority and responsibility placed with the TTO as an agent of the university. The performance metrics tracked by TTOs (e.g., ROI, total returns) and mandated by university administration (the principle), frequently lead to a scenario where the licensing terms sought are too restrictive, resulting in few or no deals. Also, the licensing terms put forward by the TTO are insensitive to CSR and, when a license is signed, the social outcomes of the agreement are not contemplated.

There is an argument to make about allowing the research group, which has qualities of a start-up firm even before it directly engages in entrepreneurial activities [15], the flexibility of acting as independent licensor of its innovations, forfeiting the agent-principal dynamics between the TTO and the university administration. In this scenario, the TTO would

offer the research group administrative support and an exclusive license in exchange of royalties or equity. When royalties are used instead of licensing fees, they signal a high-quality innovation [17]. Markman et al. [29] found support for equity licensing as a strategy that promotes the entrepreneurial process and the creation of small companies.

The redesigned interaction attending to Agency Theory would afford innovations a better chance of fulfilling their social and economic potential. For one, the technology would be allowed to mature. Also, the creation of startup-like organizations to license the technologies would build innovation ecosystems that have been identified as essential for TBED. More generally, the organizational structure of the TTO has been found to affect its ability to coordinate, align incentives, and manage external and internal information flows [5].

As a result of both IP creation barriers and IP licensing barriers, the number of technologies making it to market is reduced (Figure 2). In this respect, the TTO is not meeting its objectives of CSR. While it purports to be an agent of the government, via the flow down of Bayh-Dole requirements for owning and managing university IP, the multiple barriers created in the technology transfer process work against the objectives of the federal government and society at large. In this respect, the TTO needs to reevaluate its mechanisms from a CSR perspective, and look for incentives to create and license IP that maximize social welfare. In this case, the metric percentage of IP licensed may serve as a more legitimate measure of portfolio success than solely royalties or licensing fees.

The early-stage nature of many technologies being marketed imposes significant investment and risk exposure. As such, companies are hesitant to signing burdensome licenses that can impede their ability to take a technology to market and obtain enough returns. This decreases the TTO licensing rate and stops the flow of innovations to market, hindering TBED. Furthermore, this effect feeds back into the disclosure and review process, which incentivizes TTOs to seek "homerun" technologies that they can license for millions, reducing the number of technologies they protect.

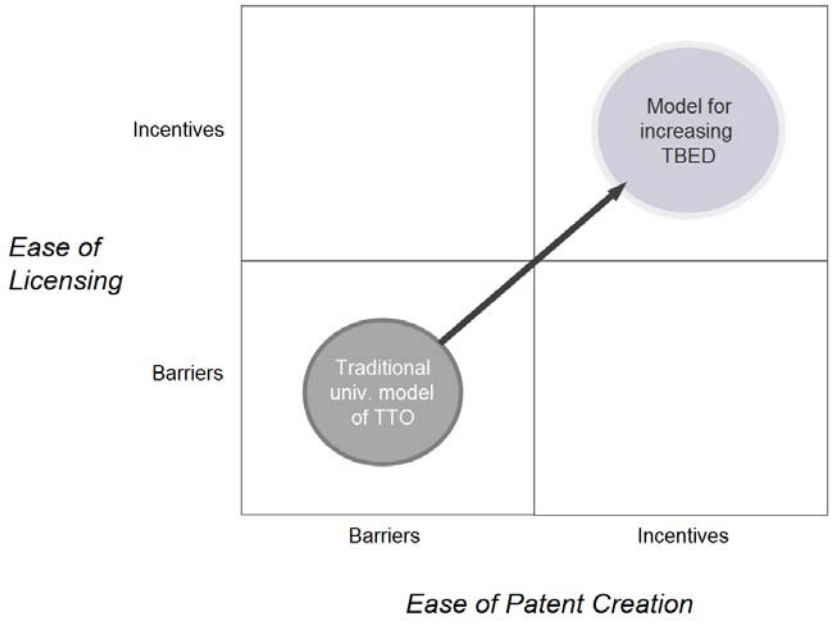

Figure 2. Model for increasing TBED and CSR.

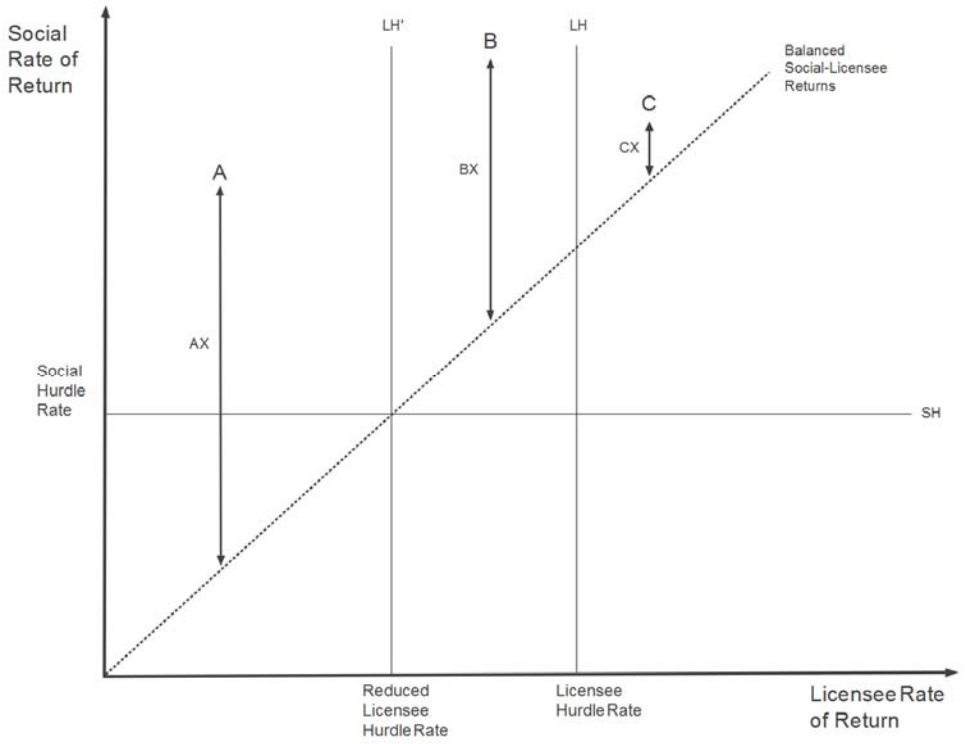

Figure 3. Licensee and social rate of return.

The relation between licensing strategy, the rate of return expected by the licensee, and the social rate of return is captured in Figure 3 (adapted from [22], [23], [34] and [27]). The predominant strategy of TTOs, focused on short-term cash maximization and distant from the social mission of their universities, places a constraint on the licensing firm trying to maximize the appropriation of returns from the investment. Although private firms increasingly take into account CSR, to simplify this discussion we attend to a licensee exclusively trying to maximize its rate of return.

As depicted in Figure 3, the firm is subject to a hurdle rate (LH) from the license that is greater than the hurdle confronted by society (SH). The licensee confronts numerous risks—e.g., technical risk, high capital cost, uncertain time to commercialization, and unexplored compatibility and interoperability with other technologies, to cite some [27]. If it were to invest in the IP, the risks could limit the level of appropriability. These barriers, in turn, make the licensee cautious and likely to acquire technologies with internal rate of return greater than its hurdle rate, independently from the value society would realize if the technology were taken to the market. The double arrows AX, BX and CX in Figure 3 depict the "spillover gap," or the deviation between the social and private rates of return for a license [23].

When TTOs follow a licensing strategy to maximize short-term revenue, they behave like private companies and sustain the licensee's high hurdle rate (LH). Restrictive and exclusive licensing, with grater associated risks, lead to high hurdle rates. But if TTOs were to adopt a long-term and social-value-driven strategy, they would decrease the licensees' risk and hurdle rate to the level LH' depicted in Figure 3, effectively making feasible for the company to invest in licenses that otherwise would be unreasonable to license in terms of private rate of return.

In Figure 3, a licensing strategy rooted on a CSR perspective would shift the licensee hurdle from LH to LH', making permissible for the firm to invest in license B, capturing a private rate of return, and realizing the high social return.

The increased appropriation of benefits for the firm would promote TBED, which in turn would create positive reinforcing mechanisms solidifying the reputation of the licensing university and increasing the number of licenses [19]. In addition, the realization of social value through an effective CSR strategy would improve the reputation of the university, which in turn would reinforce the licensing image of the institution.

IV. A CSR FRAMEWORK FOR TTOS

We proposed two complementary approaches for TTOs to consider when developing a CSR-grounded licensing strategy: re-envisioning their mission and stakeholder engagement, and acting to decrease the licensees' hurdle rate.

First, TTOs can align their mission with the social mission of their parent institutions and stakeholder expectations. To

achieve this alignment, TTOs should identify and engage with their stakeholders to assess the impact that the IP they own may have on their welfare. Open communication with stakeholders should lead to the identification and evaluation of those licenses that are important to them. To facilitate this analysis, materiality assessments (Figure 4) should be conducted for the different groups of stakeholders before a licensing strategy is formalized.

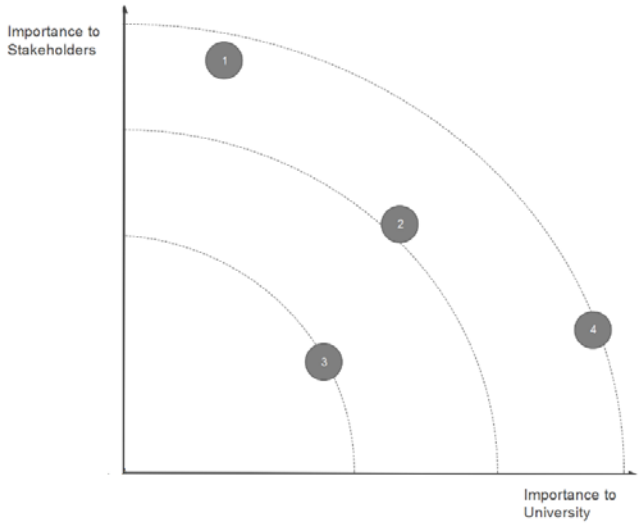

Figure 4. Materiality assessment of university licensing.

The materiality assessment would facilitate the identification of the licenses that matter the most to stakeholders and/or the TTO, enabling the TTO to prioritize its portfolio and decide the most responsible licensing conditions for each individual innovation. In addition, TTOs could provide incentives for IP creation attending to the materiality assessments. In any case, it is critical that TTO personnel are adequately trained in CSR.

Second, we propose that TTOs act to decrease the licensees' hurdle rate. This can be achieved in multiple ways, particular to both the innovation and the market. TTOs should evaluate non-restrictive approaches to licensing, including non-exclusive licenses, Equitable Access Licenses, and licenses for a royalty or equity. In addition, TTOs could promote and support the creation of spin-off firms to reduce agent-principal misalignments and push the innovation to mature stages, subsequently reducing the risk for licensees.

In the early stages of innovation, TTOs may decide to become more conscientious about when protecting the inventions. By carefully timing the protection of the invention, TTOs would allow it to sufficiently mature before filing for patent and making it available in the market. This would increase the expected private return and facilitate its licensing, as companies should be able to more easily assess the risks from licensing the innovation. The development of entrepreneurial ecosystems would also have positive social impact through TBED.

V. CONCLUSION

In this article, we evaluate the need for universities to adopt a broad CSR perspective in the technology transfer process, ensuring a sustainable future. The review of the literature provided us with three arguments in support of universities paying attention to social value creation when licensing their technologies: they use large amounts of federal funds; they enjoy tax-free status, and are consequently expected to act for public benefit; and they have a moral responsibility toward society. In addition, we make the argument that TTOs following a CSR framework would observe greater licensing returns due to synergistic processes between licensing in a sustainable manner, the public perception of the university, and licensing rates.

As the main contribution of this article, we propose a CSR framework for TTOs with two complementary approaches. First, we suggest TTOs realign their interests with the social mission of their parent universities and their federal providers, and that they identify and engage with their stakeholders and conduct materiality assessments to guide their licensing decisions. Second, we evaluate different mechanisms by which TTOs can lower the hurdle rate of potential licensees, and analyze the consequences this would have in enhancing TBED.

More complex scenarios should be studied, in particular the role that a firm's CSR perspective plays in its decision to licensing innovations from universities. We also suggest the analysis of cases in which the results of the licensing process can be examined in context.

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