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Sustainable innovation and intellectual property rights: friends, foes or perfect strangers?

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Sustainable innovation and intellectual property rights: friends, foes or perfect strangers?

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Abstract

As sustainable innovation becomes a strategy for companies to gain competitive advantage, the question of how to profit from sustainable innovation becomes central. Surprisingly, little research exists on the appropriation strategies of companies engaged in sustainable innovation and the few studies are poorly connected. This chapter focuses on intellectual property rights (IPR), the formal tools available to companies to protect their intangible assets. I link the three main types of IPRs to common archetypes of sustainable innovation and I discuss the motives why companies might file patents, trademarks or design rights or instead choose not to. I conclude by discussing how IPRs might act as incentives, barriers or be simply neglected by sustainable innovators and I offer directions for further research.

Keywords

sustainability, innovation, intellectual property rights

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1.Introduction

Incentives for firms to engage in sustainable innovation are becoming stronger, both as internal drivers and as external pressures (Berrone et al., 2013). While for some firms sustainable innovation might come as an offset of organizational changes mostly prompted by external pressures (Porter and van der Linde, 1995), increasingly companies innovate sustainably as a strategy on which to build their competitive advantage. If this is the case, appropriability questions should become strategic for companies, both the large incumbents shifting to more sustainable directions and the new entrants pioneering sustainable alternatives. These questions are about how to appropriate the returns from sustainable innovation and develop a viable business model to convince market investors. Innovation is about generating new ideas that are partly non-rival and non-excludable, implying that the innovator bears the costs of generating those new ideas, but might not collect the full returns if the ideas (partly) spill over to other economic actors. The appropriability question is a longstanding one within innovation management (see the seminal framework by Teece, 1986). Quite surprisingly, there is little research on how this question applies to the case of sustainable innovation and the little research is highly fragmented.

The profiting from technological innovation (PFI) framework of Teece has highlighted how companies can use a whole range of tools, both formal and informal, to capture the economic returns of their innovation efforts (Teece, 1986). Intellectual property rights (IPR) fall under the formal weapons available to innovators, with different degrees and objects of protection (Hall et al., 2014, Seip et al., 2019). Yet, the PFI framework appears only partially applicable to companies engaged with sustainable innovation. Two specific issues might make the relation between sustainable innovation and IPRs more complex than for other types of innovation.

First, the very use of IPRs might clash with the core values considered legitimate in relation with sustainability. The profit logic behind appropriation strategies can create tensions with the moral/societal value logic that is expected to come with embracing sustainability. Sustainable innovators might resort alternative solutions that hardly rely on IPRs, for instance by leverage open innovation solutions (Ahn et al., 2019). Alternatively, sustainable innovators might turn to IPRs with very specific motives. For instance, they might care about claiming ownership with the idea of facilitating access through licensing or with the intent to control the responsible use of their innovation (Eppinger et al., 2019).

Second, sustainable innovation typically entails commitment to sustainability in the entire value chain (Jolink and Niesten, 2015). Such commitment will prompt sustainable innovators to interact intensively with partners of all kinds, in particular suppliers but also distributors, to align the sustainability promise along the value chain. Few leaders might even opt for keeping the whole value chain inhouse to claim total control (see the case of Tesla), but for most firms the dependence upon other organizations will be a defining element of their sustainable business models. IPRs as ownership rights can act as coordination

mechanisms, but they will need to be in line with other more informal and trust-based governance mechanisms.

These two specific issues put together might prompt rather original solutions to be observed for companies involved with sustainable innovation and rather unique sets of motives to rely or not on IPRs. For instance, a number of sustainable technological fields has witnessed the phenomenon of 'patent commons', collections of free to use patents shared by large players in the fields (Hall and Helmers, 2013). Building legitimacy for new technologies and achieving momentum by facilitating timely use might be more relevant for sustainable innovation than fencing ideas with property rights. Yet, these initiatives have not been entirely successful in promoting knowledge diffusion, suggesting that motives of individual companies and their strategies need to be better understood (Contreras et al., 2018).

This chapter aims at discussing the relation between sustainable innovation and IPRs starting from the motives that sustainable innovators might have either to leverage or not to leverage IPRs in their strategies. This discussion is highly relevant in light of the current academic and policy debates on the societal effects of IPR systems. Critical observers have voiced serious concerns on whether IPRs are really serving societies in facilitating innovation (Heller, 2010). There is mounting evidence of strategic practices of IPR filing whereby large corporations erect barriers to entry for newcomers and block sustainable progress in many ways (Bessen et al., 2008; Shiva, 2001). At the same time, IPR offices worldwide also try to link their work to Sustainable Development Goals (see for instance https://www.wipo.int/sdgs/en/story.html). It remains unclear what (legal or strategic) space sustainable innovators have to engage with IPR in their own specific ways, for instance by filing IPRs but then sharing them or making them available in their own ways.

The chapter is organized as follows. The next session will briefly sketch three types of sustainable innovation (product, process and service) and link them to the applicability of three key IPRs (patents, trademarks and design rights). Section 3 will discuss motives of sustainable innovators to use or not to use each IPR, while Section 4 will conclude by linking the understanding of motives to current debates on the role of IPRs for sustainability transitions and sketch a research agenda.

2. Sustainable innovation and IPRs: what are the options?

2.1 Archetypes of sustainable innovation

'Sustainable innovation' is a very broad term that has been linked to many different definitions. The sustainability element of the label typically refers to the three dimensions of environmental, social and economic sustainability, with most of the focus in the literature going to the first one, but increasingly also on the second one (Calabrese et al, 2018). For the purpose of identifying the 'innovation' element of the definition, I will consider three broad categories of sustainable innovation: product, process and service innovation.

Sustainable product innovation takes the form of tangible products that can be adopted by consumers to move to sustainable consumption or by firms to implement sustainable production. Examples include LED lights and solar panels on the environmental and economic dimension, but also products like the Dutch Fair Phone aiming to contribute to both the environmental and social dimension of sustainability (https://www.fairphone.com/en/story/).

Sustainable process innovation concerns changes to production and organizational processes in the direction of making those processes more sustainable. Examples include changes towards increased energy-efficiency but also rethinking of value chains like in circular economy initiatives including recycling and upcycling. Process innovations are typically developed and applied within the same organization, but sustainable process innovation refers more often to systems and multiple organizations connected within value chains.

Finally, sustainable service innovation tends to have a more intangible nature as it is about novel solutions provided to meet specific needs of users. Often these service innovations are part of novel business models that challenge the existing way for firms to fulfill specific functions, so-called sustainable business models (Bocken et al., 2014). Clear examples are mobility services and the shift towards sharing models instead of ownership models. Other examples from retail are novel solutions for more sustainable logistics. In the Netherlands the BewustBezorgd (loosely translated as 'responsibly delivered') initiative couples online purchase systems of large e-retailers to a menu where buyers can consider different options for delivery after being informed about their respective environmental impact (https://bewustbezorgd.thuiswinkel.org/).

2.2 IPRs applicable to sustainable innovation

I focus here on the three most used formal IPRs: patents, trademarks and design rights[1].

A patent " describes an invention and creates a legal situation in which the patented invention can normally only be exploited (manufactured, used, sold, imported) with the authorization of the owner of the patent" (WIPO, 2004, p.17). Inventions are defined to be solutions to specific technological problems. Patent registration comes after complying to strict and often complex to prove conditions: the invention must refer to patentable subject matter, it has to be industrially applicable, it must be novel and non-obvious, and the information needed to realize the invention much be disclosed in the patent description. It should be possible to build and apply the patented invention by someone skilled in the art, which means that publication of a patent releases knowledge that can in principle be put to use. Of course, actual use is controlled by the patenting company, but the inventor can decide to license out the technology for use by

[1] There are other, more specialized, IPRs that also matter for sustainability. The protection of plant varieties is a particularly debated topic.

others, for several reasons. This is not to say that all patents are actually used, as in fact a large portion of patents remains unexploited, which is a much debated issue in the societal discussion around patent systems (Jaffe and Lerner, 2011).

A trademark is "any sign that individualizes the goods of a given enterprise and distinguishes them from the goods of its competitors." (WIPO, 2004, p. 54). The main rationale behind trademark systems is to facilitate the functioning of markets and avoid market failures derived from information asymmetries between buyers and sellers. As such, trademarks function as information signals that are supposed to reduce the transaction costs in markets. On the sellers' side, trademarks are used to indicate the source of products and services and thereby allow differentiation strategies. They are a way for firms to signal the quality of their offerings, hence they are also key to build reputational assets. Firms have strong incentives to maintain the informational value of their trademarks, hence they will engage in activities to strengthen the signal (through complementary advertisement and marketing investment) and protect it from dilution (through product recall campaigns in case of negative publicity but also legal trademark enforcement against improper use of trademarks or court cases against competing trademarks). On the buyers' side, trademarks are expected to reduce search costs by allowing to discriminate better among competing offerings in the marketplace. They also offer a retaliation weapon against sellers in case of lower quality. Trademarks are used across all sectors of the economy since they can be used in all markets, from products to services. They will be part of the market strategies of innovative companies.

Design rights "protect the original ornamental and non-functional features of an industrial article or product that result from design activity"(WIPO, 2004). In the United States design rights are protected through the patent system via so-called design patents, different from utility patents, while in Europe design rights are administered by the same office that handles trademark registrations, the EUIPO. The registration of design rights requires proving novelty in the sense of originality.

Given the specific properties of the three IPRs discussed here, one can link each IPR to specific types of sustainable innovation (see Table 1).

Patents will be relevant for both sustainable product and process innovation, as long the innovation has a clear technological dimension. Instead, patents will be less relevant for new services and business models, with the notable exception of countries where business methods and software can be patented. This is the case in the United States, but other countries have instead been reluctant to extend the applicability of patents to these domains since it remains unclear whether this extension of patentable subject matters really delivers societal benefits (Hall, 2003).

Trademarks are mostly relevant for sustainable product and service innovation, less so for process innovation given that the focus of process innovation is not on commercialization but use in production. Trademarks are used to flag the value proposition of the innovation at market introduction, using words and slogans or even figurative and design elements (shape, colours).

Design rights apply to sustainable product innovation whenever the sustainability dimension is about the actual physical properties of the product, think of packaging. For product innovation, sustainability can come together with innovative packaging which reduces transportation costs or uses more sustainable materials. Design can also have a less functional role, if it is about communicating or aligning with the value propositions in the shapes and colours chosen for the product. For service innovation, design is a key component since many new services rethink the interfaces of service provision, often exploiting digital platforms (Calabrese et al., 2018). Design thinking helps here to translate the user perspectives and practices in the architecture of the solution, hence relates to the social component of sustainable innovation.

Of course, that an IPR can be filed does not mean that it will be. In order to better understand the conditions under which sustainable innovation might be protected with any of these three IPRs, the next section will dig into the specific motives underlying IPR strategies of sustainable innovators.

Table 1: Archetypes of sustainable innovation and applicable IPRs.

	Sustainable product innovation	**Sustainable process innovation**	**Sustainable service/ business model innovation**
Examples	*LED light bulb* *Organic food* *FairPhone*	*Eco-design* *Recycling* *Energy-saving*	*Bike-sharing* *Pay-per-light* *'Bewust Bezorgd'*
Dimensions and relevant IPRs			
Technology	Patents	Patents	
Market	Trademarks		Trademarks
Design	Design rights	Design rights	Design rights

3. Motives (not) to file IPRs for sustainable innovation

3.1 Patents

Motives to patent innovation are several and range from straightforward appropriation motives related to controlling use of the patented invention either through own use or use by others upon payment of licensing fees, to motives related to building assets that innovators can use in bargaining for access to other technologies (Cohen et al., 2000, Blind et al., 2006).

Out-licensing might be a valid strategy for companies to benefit from their sustainable technologies, especially when they do not have the scale or resources to translate the technologies into actual products and services (Lane, 2011). In turn, in-licensing of other companies' sustainable technologies can provide opportunities for new ventures with the right business model to use those technologies in the markets. All in all, licensing is a major component of the open innovation model, where given companies patent and own technologies but share access to those patents through licensing agreements (Alexy et al., 2009). In such a setting, patent rights can work as efficient allocation mechanisms.

Surprisingly, companies might also give away patents for free through donations to public entities like universities or through participation to patent commons (Ziegler et al., 2004). These initiatives are relevant for sustainable innovation, as there have been a few important cases related to patents of green technologies. The carmaker Tesla made the headlines when announcing that it would open up its patent portfolios to boost technological advances in battery technology. A larger initiative has been the one of green patent commons (Contreras et al. 2018)

In some cases innovators might delay patenting to delay knowledge disclosure and hence competition (Desyllas and Sako, 2013). This buys innovators time to experiment further. Some innovators may not patent at all even if they could. This could be a strategic move, whenever innovators prefer secrecy for instance to build a first mover advantage (Arundel, 2000). It might also be wise for small and/or young firms that lack the resources to enforce patents anyway (Leiponen and Byma, 2009).

3.2 Trademarks

Companies embracing sustainable innovation clearly choose for a differentiation strategy. They choose not to compete on prices and costs, but rather to develop a value proposition that can justify a premium pricing (Delmas and Colgan, 2018) . Higher prices are also consistent with the idea of a fair retribution of all parties involved in the supply chain. If this is the case, then a strategy of brand investment appears the most sensible option. Moreover, sustainable products and service are typically 'credence goods', where reputation matters significantly for consumers to establish quality.

The sustainability of products is typically not a property that consumers can assess themselves. Instead, markets for sustainable products are characterized by strong information asymmetries given that suppliers hold the full information on the whole production chain behind a product while consumers cannot even fully experience the sustainability of products after purchase. There are different ways in which companies can deliver a trustworthy claim that consumers can rely upon.

Companies can design their own sustainable brands or private labels and protect them with trademarks (Castaldi et al., 2020) or rely on labels developed by third-party organizations. These labels can for instance be issued by a coalition of multiple commercial parties or by independent organizations (e.g. Marine Stewardship Council) that monitor whether companies comply with certification schemes. Within these practices one also finds so-called greenwashing practices, of different nature, but involving different degrees

of misalignment between claims and actual behavior. Delmas and Colgan (2018) suggest that purposefully misleading claims are only a minority of greenwashing cases. In fact when a greenwashing company associates a trademark to its practice, this gives a weapon of retaliation to (non-greenwashing) competitors and activist organizations that represent civil society. Lane (2011) documents several court cases where trademark claims around sustainability have been challenged in court. Moreover, non-profit organizations increasingly use name-shaming and brand-shaming as strategy to expose misconduct (see for a recent report Greenpeace, 2019).

There are also reasons why companies choose not to trademark. Lack of knowledge and resources is a straightforward argument that applies to small and/or young firms (Block et al. , 2015). But other reasons might also play a role. Athreye and Fassio (2019) find that the more collaborative the nature of the innovation the less likely innovators are to trademark. The reason is that a trademark comes with commercial appropriation and such a strategy can clash with collaborative nature of the collaboration. In the case of sustainable innovation an additional motive might be that moral, sustainability-driven, drivers of innovation do not appear compatible values with commercial appropriation. Social entrepreneurs struggle with combining a business attitude with their drive for a societal contribution. They can either disregard or even be completely uninformed about IPRs or about trademarks specifically. In the context of the creative sectors, where actors also struggle with competing logistics (in that case artistic vs commercial) Castaldi (2018) found that trademarks might be disregarded specifically or just broadly as all other IPRs.

3.3 Design rights

Design rights protect the visual appearance of artifacts, either physical or digital. Ghisetti and Montresor (2019) find that firms investing in design tend to produce more eco-innovation. The whole idea of 'eco-design' revolves around the transformational role that design can play in rethinking the processes and practices behind products and services. That said, one thing is taking a design perspective and another thing is wanting to make it proprietary through design rights. Seip et al. (2019) find that design rights are used in very specific sectors and by specific firms. Sectors include contexts where the design function is considered highly strategic and is internalized within organizations rather than outsourced to external contractors. In terms of firms, one finds that large IPR-active firms will tend to leverage all possible IPR types and hence will also appear as intensive users of design rights. These are large firms that can rely on expertise to draft IPR applications and financial resources to monitor and enforce rights as well. Instead, most designers and other creative entrepreneurs will neither have the knowledge nor the resources to embrace the opportunities from IPRs (Vankan et al., 2014, Castaldi, 2018).

Table 2: Motives for (sustainable) innovators to apply or not to apply for the patents, trademarks and design rights.

	Motives to	**Motives NOT to**
Patent	Appropriate rents from technology from own use To license-out inventions Owning to share, for ex. Through participation in patent commons Delay competition and have time to experiment	Lack of expertise/knowledge No technological invention Secrecy is chosen, to have first-mover advantage or for lack of resources
Trademark	Flagging market introduction Legitimizing identity Establishing market position and allow differentiation strategy Attracting external funding Complementing patents or substituting them	Lack of expertise/knowledge Collaborative nature of the project Clash of commercial vs sustainability value/logics
Design rights	Protection of design from imitation Control design-mediated communication to users Complementing other IPRs	Lack of expertise/knowledge Design not recognized as strategic function

4. Conclusions: towards a research agenda on IPRs for sustainable innovation

There seem to be enough reasons to believe that IPRs can ideally support sustainable innovation by providing rights that empower innovators towards different ends. Profit making is one end but social impact can in principle also be aligned to a well-crafted of IPR strategy, for instance through selective licensing. Yet, we see many instances when IPRs appear to be acting as impediments rather than incentives.

While the literature seems to focus either on the positive or negative effects, little attention has been given to the consideration that most firms engaged with sustainable innovation will neglect IPRs and may be perfectly fine doing so unless they become embroiled in legal cases they did not foresee. In fact, we lack systematic evidence on the actual practices of IPR use by sustainable innovators and their desirability from a societal point of view. Further conceptual and empirical research could focus upon four promising research avenues.

A *first* open question relates to the ongoing debate on reforming IPR systems to fix emerging distortions (Dosi et al., 2006; Henry and Stiglitz, 2010). The current trend for almost all IPR laws has been one of

extending the applicability of rights towards new domains with the natural implication that IPR filings have been increasing exponentially. At the same time the reviewing process and the monitoring has not been tightened, resulting in lower quality of the granted rights, for instance, too incremental patents, only filed for strategic purposes. Increasingly, IPR systems appear to be serving the predatory strategies of a few (large) companies which have the resources to hire expansive lawyers, win court cases and leverage all legal opportunities by stacking different IPRs as well. If this is the case, then a pressing question is whether smaller and less experienced firms still have proper access to IPR systems: are sustainable innovators able to leverage the opportunities of IPR systems?

A *second* research trajectory could focus on specific sustainable innovation cases, to collect best practices and common bottlenecks in leveraging IPRs. A very interesting context is the one of circular economy initiatives, which often involve sharing of materials and components across different organizations and places, with complex questions of ownership. In fact, several studies by now have shown how IPRs often act as impediments, for instance because of exclusive contracts forced by original equipment manufacturers that frustrate attempts a refurbishing and extending product life-cycles. Yet, the Right to Repair initiative is gaining momentum both in Europe and in the United States (Svensson, et al., 2019). Trademark or patent-protected spare parts could still thrive next to unprotected ones in a situation where consumers would be empowered to choose their preferred option. Research should look into cases of specific industries and investigate actual and possible governance solutions.

A *third*, and related, research domain concerns how IPRs can facilitate the mainstreaming of sustainable innovation by diffusing knowledge and showcasing practices. On the one hand, the poor performance of patent commons (Contreras et al., 2019) sheds major doubts on the effectiveness of patent systems to spur knowledge diffusion, on the other hand, there might be ways to align private and public incentives better, through institutional changes at the levels of norms and/or legislations. There is a much broader range of ways of leveraging IPRs than the most common practices biased towards 'closed models' (Vimalnath et al., 2019).

A *fourth* research opportunity could be to broaden the geographical reach of current studies. More inclusive studies capturing the experience of the Global south, not only as victims or laggards, but as providing frugal solutions tweaked in environments where actors cannot rely on strong IPRs. The current norms around IPR systems stem from the choices of a few developed economies, most significantly the United States (Henry and Stiglitz, 2010). A genuine debate on the efficiency of strong IPR systems should take seriously the practices emerging in weak IPR contexts.

A *fifth* and last research agenda item concerns conceptual work. Can we elaborate a responsible IPR framework that can guide firms but also IPR institutional actors into more sustainable practices? It appears that current institutions offer enough regulatory space for economic actors to engage with IPRs according to very different norms: some actors can use this space to devise strategic practices, others will use it to put forward inclusive and sustainable practices of IPR use. Several factors might play a role in facilitating the

second choice, for instance the type of pressures from customers, suppliers or investors. A conceptual framework on responsible IPR could build upon firm-level theories such as resource-dependence (Pfeffer and Salancik, 2003) or institutional economics (Scott, 2013) to understand motivations and processes. Such a conceptual framework could then be translated into an organizational tools for companies that want to make responsible IPR practices an integrated element of their sustainability goals.

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