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Open IP strategies for enabling sustainability transitions

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Abstract

As global societies are evolving to knowledge economies, intellectual property (IP) is becoming increasingly important. Contemporaneously, firms are opening up their innovation processes in contrast to the internally focused closed innovation paradigm, making IP of substantial relevance for firms as well as for societies. However, in spite of this relevance, existing literature about Open IP approaches is scarce, and most existing investigations are focusing on the software industry. This paper links Open IP to social and environmental issues, and particularly discusses IP strategies against the backdrop of sustainability transitions. The challenges for innovative, small companies to compete with incumbents and their role to contribute to sustainability transitions are demonstrated and suggestions for promising future research are presented.

Keywords: Open intellectual property, sustainability transitions, technology diffusion, Tesla Motors, Nutriset

1. Introduction

Intellectual property (IP) is one of the major assets of today's societies globally and is gaining increasing importance as countries evolve towards knowledge economies. Therefore, managing the production of knowledge and the possibilities to access knowledge is central to our knowledge economies and determines of who benefits from this development (Stiglitz 2008).

IP law incorporates the inherent tension between private gain and public welfare. To foster innovation, governments strive to ensure that innovators can benefit from undertaking innovative activities, hence private R&D investments. However, protecting IP owners, particularly large incumbent firms, too strictly may limit the dissemination of new ideas, harming social interests and decreasing economic progress (Gould and Gruben 1996). The IP regime is an important part of national innovation systems (Stiglitz 2008), which are becoming increasingly important as such (Rhoten and Powell 2007). Changes in IP protection reflect a pattern with new objects and subjects of property (e.g., living organism, mathematical algorithm, basic research tolls and databases), a shifting locus of enforcement as well as longer terms of protection (Rhoten and Powell 2007). As we will show later, IP impacts various industries. Its importance can be demonstrated, e.g., in healthcare, in which IP may affect access to life-saving medicines for millions of people, particularly in developing countries (Stiglitz 2008). Major tools of IP used by institutions are patents, copyrights, trade secrets and trademarks. These legal mechanisms for establishing ownership vary in terms of subject matter protected, exclusivity of rights granted, attribution criteria used as well as incentives conferred. However, what they do have in common is their critical function of granting the inventor monopolistic rights over the use of an inventive artefact and grant a certain amount of control (Rhoten and Powell 2007).

As it will be shown in this paper, IP is important to strengthen small firms so they can contribute to societal progress and particularly enable sustainability transitions. Solving today's societal and environmental problems, such as human induced (anthropogenic) climate change and the need to move from a carbon-based towards a sustainable-energy society, but also malnutrition in developing countries, poverty, access to clean water, to name only a few require substantive changes in energy, transport and agri-food systems (Elzen, Geels et al. 2004; Wiskerke and van der Ploeg 2004; Van den Bergh and Bruinsma 2008; Geels 2010). These long term trajectory changes, often made difficult due to path dependencies on multiple levels are often labelled sustainability transitions, due to sunk investments and existing infrastructure. Furthermore, the existing systems often focus on incremental innovation along predictable paths (Unruh 2000; Geels 2010; Verbong and Geels 2010). However, more radical innovations, i.e. path-breaking changes are needed that put pressure on and disrupt existing systems, leading to "cracks" in the existing trajectories, creating tensions and ultimately windows of opportunities (Geels 2010; Verbong and Geels 2010). In this paper we argue that careful management of IP on firm level, supported by policy level awareness can be a powerful instrument to support sustainability transitions. While intellectual property rights are often associated with protectionism supporting incumbents to prolong life-cycles (e.g. Granstrand and Tietze 2016) and hence extending the

status quo, in this paper we particularly focus on how IP can be used by newly emerging firms to change the status quo and initiate sustainability transitions, with particular emphasis on the use of firm-level Open IP strategies.

The remainder of the paper is structured as follows. The next section provides a first overview of the intellectual property (IP) literature from a managerial, firm-level perspective as a basis for generating future research suggestions of how IP management and policy making may contribute to sustainability transitions drawing to some first initial case examples. Accordingly, the paper is structured as follows. First, IP's relevance for addressing social challenges is shown in the next section. Then, the Open IP phenomenon with a special focus on the software industry is presented in section three. Subsequently, three Open IP cases are presented. The first case illustrates the use of Open IP strategies in the software industry, widely known as open source, then followed by the two cases of Tesla Motors and Nutriset to illustrate how firms trying to make a positive societal impact employ Open IP strategies in practise. Section five outlines future research opportunities we see. Finally, section six concludes this paper.

2. Social challenges, intellectual property and firm size

Firms patent not only to protect their own technology. Oftentimes, they patent to control technology needed by their competitors (Cohen, Nelson et al. 2000). Thus, they are strengthening their position in negotiations with rivals, e.g., using cross-licensing agreements (Cohen, Nelson et al. 2000). Nowadays, hardly any firm can move ahead on developing and commercializing new technology without access to external, often even rival-owned technology. If access to competitor's technology is essential to be a viable player, and only incumbents holding major patents can achieve such access, then patenting can hamper entry and the innovation by which it is often accompanied. In this case, not a single firm is protected by IP rights, but a whole group of oligopolistic incumbents (Cohen, Nelson et al. 2000). Cohen, Nelson et al. (2000) draw attention to another problem. As the number of firms holding separately patented pieces of the same technology becomes too large, commercialization can fail due either to a stacking of licensing fees or a breakdown in negotiations arising from asymmetric subjective valuations of patent rights and associated transaction costs (Merges and Nelson 1990; Scotchmer 1991; Heller and Eisenberg 1998). But even if patents of the same technology are owned by a smaller number of firms, another problem may occur. Under certain conditions with limited competition a firm has incentives to maintain its monopoly power by patenting new technologies before potential competitors. This activity can lead to patents that are neither used nor licensed to others ("sleeping patents"), preventing potential competitors from industry entry (Gilbert and Newbery 1982).

The ability to benefit from R&D and IP also depends on firm size. Even if large firms may be confronted with different drawbacks concerning their size in comparison with smaller competitors, e.g., limited creativity and 'sluggish' behaviour in responding to opportunities (Cohen and Klepper 1996), they may benefit a lot of their size particularly concerning their

R&D and IP related activities. First of all, larger firms are likely to have advantages in R&D because of larger output over which they can apply their results and thus spread the costs of their R&D activities (Cohen and Klepper 1996; Cohen and Klepper 1996).

Small entrepreneurial companies frequently fail to obtain significant economic returns from innovations, whereas competitors, customers, or other industry players benefit. One possible explanation may be that large companies are more likely to possess relevant specialized and co-specialized assets, already during the new product introduction process. Therefore, it is easier for large firms to use their technology (Teece 1986). Concerning their IP activities, large firms are able to spread fixed costs of applying for and defending patents over greater levels of output (Cohen, Nelson et al. 2000). Additionally, large firms can also benefit as it is easier for them to influence international standard-setting (Ho and O'Sullivan 2016), which may also be economically beneficial.

From a perspective which aims to foster innovation and enable sustainability transitions and social change, the discussed advantages of large firms concerning their resources, R&D and IP activities, but then limited market entry of smaller, entrepreneurial firms poses a problem. The resulting limited competition can lead to social welfare losses (Cohen and Klepper 1992; Cohen and Klepper 1996). As small entrepreneurial firms often generate new, valuable innovations, whereas large firms tend to generate less meritorious innovations (Teece 1986), valuable innovation and social change may be impeded. Since small firms considerably contribute to technological change (Libaers, Hicks et al. 2016), white-knuckled transformations also become unlikely.

The problem described can be exacerbated by another threat. The more a technology with increasing returns is adopted, the more experience is gained with it and the more it is improved. This can lead to the dilemma that early adopted, but inferior technology becomes dominant, whereas the technology which can be seen as superior in the long run will be locked out (Arthur 1989). There are many cases discussed in literature that an early-established technology becomes dominant, while superior technologies loose (Arthur 1989). Prominent cases are the US nuclear industry, dominated by light-water reactors whereas the gas-cooled reactor would have been superior (Agnew 1981), or the narrow gauge of British railways (Kindleberger 1983). A highly topical example is the incumbent controlled automotive industry, still dominated by gasoline-powered vehicles, even though electric vehicles are regarded as the “better” technology in various respects. We touch up this topic in more detail by presenting the case of the electric car manufacturer Tesla Motors. Thus, it is conceivable that technologies are dominating different markets that are inferior to other technologies. As established, large firms oftentimes are less innovative (Teece 1986) and smaller, entrepreneurial firms are prevented from entering the market, an enormous innovation potential is given away. Keeping in mind the potential positive influence of innovation and technological change on millions of people, this situation is hard to bear and necessitates future research.

3. The emergence of Open IP

“Traditionally”, firms have often managed innovation as an internal process, relying upon their own skills and capabilities. However, in an era of rapid development and diffusion of valuable knowledge, this closed approach to innovation appears often not viable. Firms that want to maintain their innovation capacity must begin to manage IP via the logic of open innovation (Chesbrough 2003; Chesbrough, Vanhaverbeke et al. 2006). The opening up of the innovation process is of highest practical relevance and has become increasingly popular in leading industries such as software and biotech. Well known examples for open innovation in practice are Philips’ open innovation park or Siemens’ open innovation program (Gassmann, Enkel et al. 2010; Ziegler, Gassmann et al. 2014). Open IP is a fluid approach, emphasizing both the use of R&D produced outside the firm as well as the development of internal systems to reward viable innovation within the firm (Chesbrough 2003).

In such an open innovation system, out licensing, cross-licensing, and selling of patents are the most important forms to use IP (Granstrand 2004; Ziegler, Gassmann et al. 2014). With that development the role of IP has changed from protection to a tradable good. For instance, large auctions of IP were organized and auctioneers such as Ocean Tomo (Tietze 2012). Furthermore, patent funds buy intellectual property and leverage the IP value through professional management (Gassmann, Enkel et al. 2010; De Vries 2012). Other firms license patents on a royalty-free basis to organizations that manage patent pools. These alliances are called non-commercial patent pools (West and Gallagher 2006; Ziegler, Gassmann et al. 2014). All these IP trade possibilities only represent a starting point in trading IP and it is expected that trade in IP will gain considerable relevance in the near future (Gassmann, Enkel et al. 2010).

However, openness seems to be limited for various players in the IP market. Chesbrough (2013) indicates that open innovation can also be too open and there is a risk of appropriation of innovative efforts by others. Therefore, IP protection, e.g., by contracts with partner firms, is still unavoidable (Luoma, Paasi et al. 2010; Hagedoorn and Zobel 2015).

4. Open IP strategy in practise

This section presents three case examples about how Open IP strategies are employed. We start with a closer look at the software industry in which the spread of Open IP strategies is most advanced in comparison to other industries. Then, using two “small” firm cases we provide examples about how firms use their IP differently to succeed in competition with large firms. In these cases we separate between “complex” and “discrete” technologies (Levin, Klevorick et al. 1987; Merges and Nelson 1990; Kusunoki, Nonaka et al. 1998; Kash and Kingston 2001). A complex technology is whether a new, commercialisable product or process comprised of numerous separately patentable elements, versus a discrete technology only comprised a few patentable elements (Cohen, Nelson et al. 2000). The electric car manufacturer Tesla Motors (4.2) is operating with a complex technology, whereas Nutriset (4.3), the manufacturer and

trademark owner of Plumpy'nut, a peanut-based food for use in famine relief, is dealing with a discrete product also using patents.

4.1 Open IP for software

The success of open innovation through open sourcing in the software industry is well known and recognized (Ziegler, Gassmann et al. 2014). Open source software includes source code that can be redistributed and modified to others, while the original author's contribution is acknowledged depending on different creative commons licenses, which have been developed by the open source community (Perens 1999; West and Gallagher 2006). Hippel and Krogh (2003) point out that the open source phenomenon is an exemplar of a compound private-collective model of innovation containing elements of both proprietary and public models of knowledge creation which may offer highest value for the society. Open source projects may be more efficient than the projects performed within companies, e.g., as a boundless group of testers is able to eliminate even the smallest bug promptly (Raymond 2001). Furthermore, open source can accelerate technology diffusion (Lerner and Tirole 2002), increase development speed and the reliability, portability and scalability of the product (Rhoten and Powell 2007), besides reducing the prices for commercial software due to its coexistence with open source software (Mustonen 2003). These benefits are realisable in spite of potential drawbacks of open source projects such as higher coordination costs and risks (West and Gallagher 2006). From a social perspective, open source projects are promising due to another reason. Small firms can benefit from open source, e.g., as R&D investments of small firms are scarce, they benefit in a particular way from the R&D activities of the community (Bonaccorsi and Rossi 2006). Besides the mentioned advantages of open source projects, its characteristic to foster innovative small firms may also favour sustainability transitions. Open source projects in the software industry are often politically supported, e.g., by the European Commission which also strives to adopt open source technologies and products (European Commission 2016).

The motivation of individual developers and companies to participate in the open source movement is not immediately apparent, as, e.g., individual developers do not receive direct monetary rewards for their contributions (Glass 1999; Bonaccorsi and Rossi 2006). Research reveals that individual programmers are mainly driven by social motivations such as fighting against the monopoly power of the software firms or by social status ambitions (Raymond 2001; Bonaccorsi and Rossi 2006). In contrast, firms are mainly driven by economic and technological reasons to contribute to open source projects. Economic reasons include particularly the supply of software related services, as license fees are not allowed in open source projects. The possibility that open source enables small firms to be innovative is another economic reason for firms to contribute to open source projects (Bonaccorsi and Rossi 2006; West and Gallagher 2006). Technological motivations include, e.g., the contribution and feedback from the community as well as the reliability and quality of the open source software (Bonaccorsi and Rossi 2006). Thus the software industry demonstrates that open source projects

can be used to realize superior solutions not considered possible by many observers. Open IP also offers opportunities particularly for smaller firms, hence fostering innovation and enabling sustainability transitions.

4.2 Open IP strategy for accelerating the diffusion of sustainable technologies – The Tesla Motors case

The automotive industry is a particularly interesting area to study firms Open IP strategies. IP plays an important role in the automotive industry (Stiglitz 2008). It is dominated by large incumbents, of which many are more than 100 years old. It can be argued that in today's automotive industry the inferior technology, gasoline-powered vehicles, is by far dominating about the electric vehicles, the superior technology, which is substantially promoted by Tesla Motors. It is interesting to note that some electric vehicles have already been developed in the nineteenth century, and that electric vehicles even experienced a brief period of ascendancy at the early twentieth century, before the internal combustion engine began to dominate (Kirsch 1997; Westbrook 2001). However, as different attempts to foster electric vehicles such as California's electric car program have failed, this dominance still persists (Stringham, Miller et al. 2015).

The electric vehicle offers much higher energy efficiency, is easily powered by renewable energy and with zero emission (Chan 2007), can be much safer and requires radical less maintenance efforts than conventional vehicles, to name just a few advantages. Thus electric vehicles are of high social value and can contribute to sustainability transitions as they help to solve the world's largest problems, such a global warming and air pollution. Therefore, the automotive industry can serve as a useful case to demonstrate that an inferior technology dominates, whereas the diffusion of the "better" technology proves to be difficult (Arthur 1989).

Literature supposes that small entrepreneurial firms appear to be particularly adept at major innovations and decisively contribute to technology change (Rosen 1991; Cohen and Klepper 1996; Libaers, Hicks et al. 2016). This also seems to hold true for Tesla Motors which can still be regarded as a small player with its few thousands employees in comparison with the other car manufacturers employing hundreds of thousands people. Tesla Motors' R&D intensity is more than three times higher than the R&D intensity of the other firms in the automotive industry (Statista 2016), contributing to make Tesla Motors one of the world's most innovative company (Fortune 2016). Moreover, Tesla Motors is able to generate cross industry innovations, providing sustainable mobility solutions, e.g., by offering appealing products to generate power (solar roof), stationary energy storage (Powerwall), and vehicles. Therefore, it seems that the company can be an important enabler of sustainability transitions.

Tesla Motors is also a case of special interest due to its Open IP strategy. In 2014, Tesla Motors offered open licenses to its patents and has announced that it "will not initiate patent lawsuits against anyone who, in good faith, wants to use our technology" (Musk 2014). With this step,

Tesla Motors is an example of a company driving sustainability transitions that made its IP open source (Stringham, Miller et al. 2015). The patent pledge concept comprises that patent owners will, under certain terms and conditions, abstain from asserting patent rights against third parties who are engaging in activities that might otherwise cause a patent infringement (Wen, Ceccagnoli et al. 2016). It frequently aims to reduce licensing costs and litigation threats (Wen, Ceccagnoli et al. 2016) and thus promote cooperation and collaboration between firms, besides improving reputation and public relations (Hall and Helmers 2013). Firms such as Google, Microsoft, IBM, Sony and Bosch have pledged IP in the recent past (Hall and Helmers 2013; Stringham, Miller et al. 2015). Firms usually pledge a small part of their patents portfolios, and typically do not pledge their most important patents (Bort 2010; Hall and Helmers 2013; Wen, Ceccagnoli et al. 2016). In contrast, Tesla Motors made its entire intellectual property open source and is likely to represent the largest firm so far which has made this step (Stringham, Miller et al. 2015).

Tesla Motors' open source initiative officially aims advancement of electric vehicle technology. Even, if for example Wen, Ceccagnoli et al. (2016) guesses that Tesla Motors hopes to promote complementary innovation in electric cars because of the platform competition between electric and gasoline-powered vehicles, we still do not know much about the strategy and its effects used by Tesla Motors. While Tesla is an example of an Open IP strategy employed by a company that drives a sustainability transition towards electrical mobility the following case illustrates how a social entrepreneurial venture uses IP strategically to protect its sustainability-focused business model against incumbents to create a societal impact.

4.3 Protecting business models of social entrepreneurial ventures – The Nutriset case

Operating in a discrete technology market, the manufacturer of food for famine relief, Nutriset, has taken a different IP strategy than Tesla Motors. Nutriset determinedly protects its invention, Plumpy'Nut, by patents, causing an embittered discussion about the IP protection of a revolutionary humanitarian food innovation. Plumpy'Nut is a peanut-based paste for treatment of severe acute malnutrition. As Plumpy'Nut is a ready-to-use food which enables a home-based therapy, it provides an important alternative to supervised, inpatient, high-energy therapy and therefore enables the treatment of more patients (Sandige, Ndekha et al. 2004). Thus it was able to transform the treatment of acute malnutrition. Nutriset claims that it uses patents to protect its business model, which is to ensure the local production of Plumpy'Nut creating local skills and employment in developing world countries to avoid that the market will be flooded by cheap surpluses produced elsewhere (Schofield 2014). Nutriset runs the PlumpyField network, an initiative to improve access to innovative nutritional products fulfilling international quality standards through production in developing countries, close to the people requiring these products. Roughly one quarter of all Plumpy'Nut products worldwide were produced in developing countries (Nutriset 2016). To ensure and enhance production in developing

countries Nutriset argues for patent protection, whereas non-profit organisations claim to overturn the patent. According to their opinion, this would facilitate other manufacturers to produce similar and cheaper peanut-based products (Schofield 2014) produced by global manufacturing sites then shipped to developing countries, while Nutriset wants to build local manufacturing sites creating skilled jobs locally. Although both arguments are reasonable and it is hard to take sides with one of the opponents, Nutriset provides another illuminating example about how IP strategies of small and innovative firms help to make a social impact.

5. Future research avenues

Open IP provides a fertile field for future research. To enable sustainability transitions, a guiding question that requires future investigations is, how Open IP can be used to address the discussed challenges to foster technology diffusion, particularly of those technologies that promise a positive social impact, such as electric mobility and renewable energy. Such research has been demanded for years (Cohen, Goto et al. 2002) and can contribute to diminish existing inefficiencies and social costs while fostering innovation (Stiglitz 2008). Besides concrete implications for firms, the outlined research also promises to generate policy recommendations, i.e., how governments can use IP regimes to support the transition to sustainable economies.

It is proposed that a well-functioning innovation system needs to disseminate and use the produced knowledge promptly (Stiglitz 2008). However, also due to IP protection, this is not easy to achieve. As a heterogeneous set of competencies and technologies is required for successful innovations (Libaers, Hicks et al. 2016), but technologies are often held by others (Cohen, Nelson et al. 2000), trade in IP is a promising possibility to disseminate knowledge and accelerate the diffusion of technologies. The trade in IP, e.g., by auctions of IP, patent funds, or patent pools is a relatively new development and it is expected that a completely new industry will arise around IP's secondary markets (Gassmann, Enkel et al. 2010; Tietze 2012), creating a research field with high potential. Nowadays, we still have little knowledge about the benefits and drawbacks of these new trade options. Questions such as how these options are influenced by country specific characteristics (e.g., open vs. closed traded regimes), technology characteristics (e.g., complex vs. discrete) or firm characteristics (e.g., size, innovativeness) are predominantly unanswered. However, promoting knowledge in this field can help to speed up the diffusion of technologies such as the electric car or enable the development of drugs indispensable to life and thus may help to realize sustainability transitions and social change. It is also likely that other trade options will arise which need to be analyzed. Thus future research can contribute to answer the question how IP trade can effectively be used besides classical licensing or selling to address social and environmental issues (Reisch 2002; Hasper 2009; Henkel and Maurer 2009; Ziegler, Gassmann et al. 2014). Research about the phenomenon to share know-how and IP free of charge, a viable strategy to promote innovation in various high-tech industries, seems particularly promising (Ziegler, Gassmann et al. 2014).

Existing literature on Open IP approaches is scarce and mainly considers the software industry (Ziegler, Gassmann et al. 2014). Before open source software has turned out to be a success, the assumption that a requirement to contribute an innovation to a public good would lead inevitably to the destruction of incentives to innovate, was widely spread. These concerns were mainly based on possible free-riding activities by others (Dam 1995; Granstrand 1999; Von Krogh and Von Hippel 2006).

Inevitably, the open source software raises the question: Is the open source model limited to the software industry or could it be extended to other technological innovations (Lerner and Tirole 2002; David 2004)? This seems to be a promising question for future investigations as even though the open source model may not simply be transferred from software to other industries, different aspects exist, which are not industry specific, and, therefore may also be used in other industries (Lerner and Tirole 2002; West and Gallagher 2006). Von Krogh and Von Hippel (2006) also take this view and point out that there is no reason to believe that open source practices cannot spread to other economic or social activities. Therefore, studying the open source phenomenon potentially offers rich insights and possibilities for future research. By fostering our understanding of how private needs and wants can create innovative public goods using IP, it is of outmost importance to the society and the economy (Von Krogh and Von Hippel 2006). This applies all the more as an open source accelerates technology diffusion (Lerner and Tirole 2002).

Moreover, studying specific firms and their IP strategies offers stimulating insights to professionalize the open innovation process (Gassmann, Enkel et al. 2010). Wen, Ceccagnoli et al. (2016) state that we have still little knowledge on how different IP strategies influence innovative activity or information about the conditions under which these strategies are most effective. According to the authors this also holds true for the IP strategies of important firms such as Google. Therefore, the way how firms use IP strategically needs to be better understood. It is not yet clear why Tesla Motors and other companies open up their IP portfolio. It seems that this has nothing to do with a disbelief in intellectual property rights, but must be considered as strategic behaviour, for instance to accelerate technology diffusion. Hence, by studying firms that promote the sustainability transitions, we would better understand what governments can do to help those companies using IP effectively. While many marketers believed that new firms have no chance to enter the automotive industry, Tesla Motors was able to do so and has shown that startups can disrupt the status quo in one of the most established industries (Stringham, Miller et al. 2015). Despite the huge success of Tesla Motors to ‘shake up’ the automotive industry and to become one of the most innovative companies worldwide, surprisingly little research investigates Tesla Motors’ case. That is all the more surprising as Tesla Motors is focusing on an open-source-philosophy and is a pioneer for self-driving autonomous and thus software dominated vehicles. Therefore, it is very likely that the car of the future can benefit from insights of the advanced open innovation movement from the software industry. For instance, different characteristics of the software industry such as quality and reliability (Bonaccorsi and Rossi 2006) are undoubtedly relevant to the automotive industry as well.

Consequently, research which transfers insights from the software to the automotive industry can help tremendously to accelerate technology diffusion at the automotive industry and, as such, enables sustainability transitions.

6. Conclusions

Despite its relevance for firms as well as for the global societies, scientific investigations about Open IP are rare. This paper links Open IP to social issues and particularly sustainability transitions and outlines the influence of firms' IP strategies on social aspects. It shows that different factors such as the dominance of incumbents and the challenging market entry of small, innovative firms in different industries may hamper sustainability transitions and social change. However, Open IP plays an important role to alleviate this problem, e.g., due to its benefits particularly for small, innovative firms and its potential to foster technology diffusion. It has been shown that small, innovative firms play an important role in enabling sustainability transitions, e.g., by the case of Tesla Motors. Furthermore, the cases of Tesla Motors and Nutriset illustrate how different "small" firms' IP strategies may be used to pursue their business models and how these IP strategies impact social matters. Finally, a wide research field opens up in Open IP. One promising field relates to trade in IP, another in studying the open source movement in the software industry, and, for instance, its transferability to other industries. Finally, studying specific cases of firms that have pledged their IP, such as Tesla Motors, seems promising. This research also exhibits the potential to generate comprehensive implications for various decision makers, not merely in firms, but also in policy.

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