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From Managing Innovation to Governing Value: Reconceptualizing the Role of Intellectual Property in the Sustainable Business Model

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ABSTRACT

The role of intellectual property (IP) in promoting or hindering sustainable innovation now forms a topical issue in innovation management. Its role in the sustainable business model remains imperfectly understood however, creating a simplified view of IP in relation to corporate sustainable development. Hence, this study sought to examine how IP was used to manage value rather than innovation in the context of sustainable entrepreneurship as practiced in the fashion industry. Studying the IP decisions of 24 ventures, motives were compared against those found in the existing literature to reconceptualize the role of IP, from managing innovation to governing inclusive flows of value across a value network. However, relating IP to economic, social, and environmental value creation and capture revealed asymmetries, with IP enabling an economic imperative as opposed to providing a social and environmental incentive.

1 | Introduction

The fashion industry has long faced criticism for its sustainability issues in the form of waste, pollution, and poor labor conditions faced primarily by developing countries in the Global South (Niinimäki et al. 2020). The lion's share of value has been captured by the economic realm while costs have been borne by society and the environment (Ritala et al. 2021). Mounting pressure to change hence inspires attempts at replacing unsustainable practices and materials with more sustainable alternatives, many of which are driven by startups (Hummels and Argyrou 2021; Kasana et al. 2024; Vimalnath et al. 2022), as barriers to change exist for incumbents in particular (Bocken and Short 2016). Startups, in contrast, may be better positioned to promote alternative technologies and value propositions and have a stronger incentive to champion disruptive change (Eppinger et al. 2021; Hockerts and Wüstenhagen 2010). As a

result, the industry has seen an influx of new actors, technologies, and business models, accompanied by a wealth of new intellectual property (IP).

The role of IP in sustainable innovation is contested however (Castaldi 2021; Morales et al. 2023; Vimalnath et al. 2022). On the one hand, IP, in the form of for instance patents and trademarks, can hinder the diffusion of sustainable innovation by erecting barriers to widespread adoption and diffusion (Athreye et al. 2023). On the other hand, IP often forms a necessary incentive for innovation and facilitates adoption through licensing, co-development, and acquisition (Chesbrough 2003; Eppinger et al. 2021). Open IP structures, such as patent pledges and waivers, have moreover proven capable of enabling the diffusion of sustainable innovation (Bustamante et al. 2023; De Rassenfosse and Palangkaraya 2023), while collective structures enable a more equitable distribution of value (Meyer and Naicker 2023).

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In the context of sustainable entrepreneurship, the contested role of IP is exacerbated by the need to achieve economic, social, and environmental value in an integrated manner (Castaldi 2021; Davies and Chambers 2018; Eppinger et al. 2021; Hirschmann and Block 2022). In contrast to incumbents, which have the option of modularizing sustainable and commercial lines of business (Magnusson and Werner 2023), startups need to achieve integrated outcomes using a single value proposition (Muñoz and Cohen 2018). As such, there is a much stronger imperative for IP to support all forms of value. Alternatively, there is a much greater risk of IP inhibiting social and environmental value by singularly enabling economic value creation and capture. Notably, by improving the appropriability of economic actors only, IP can indirectly disadvantage societal and environmental stakeholders, as different forms of value are often interchangeable (Hahn et al. 2018; Yang et al. 2017), while appropriability is interdependent (Holgersson et al. 2018; Ritala et al. 2021).

That is, IP has traditionally featured as an element of the appropriability regime that allows firms to profit from their innovation (Teece 1986; Pisano 2006). As such, it plays a central role in firms' appropriability (Hurmelinna-Laukkanen and Yang 2022; Thomä and Bizer 2013; Zobel et al. 2017). The advent of the sustainable business model as a way of driving business-led sustainable development challenges this role by including social and environmental value as autonomous corporate ends (Hahn et al. 2018). Specifically, IP allows firms to capture economic value in order to recuperate investments made towards developing an innovation (Granstrand 1999). However, innovation consumes not only economic but social and environmental resources, with no similar mechanism for recuperation (Hummels and Argyrou 2021; Upward and Jones 2016; Yang et al. 2017). Rather, the literature on sustainable business models often implicitly assumes that where social and environmental value is created, it will automatically be captured by relevant stakeholders (Lüdeke-Freund et al. 2020; Ritala et al. 2021). Meanwhile, research on appropriability focuses almost exclusively on the corporate perspective, and hence the (economic) value that is captured by corporates (cf. Ahuja et al. 2013; Holgersson et al. 2018; Hurmelinna-Laukkanen and Yang 2022; Morales et al. 2022; Zobel et al. 2017).

As such, the issue is not so much whether IP unequivocally helps or hinders sustainable innovation, but rather how IP as part of the sustainable business model is used to enable value creation and capture. Note that sustainable innovation may itself hinder sustainable development where efficiency gains lead to increased production and consumption (Dyllick and Hockerts 2002; McGahan et al. 2021) or where firm-level outcomes fail to yield a system-level impact (Isil and Hernke 2017; Seager 2008; Stubbs and Cocklin 2008). Innovation may hence create economic value without producing social or environmental results. Notably, research has explored motives for using IP that go beyond incentivizing innovation by enabling appropriation in the context of both commercial (Blind et al. 2006; Thomä and Bizer 2013; Holgersson 2013) and sustainable innovation (Morales et al. 2022, 2023), and the role of IP is found to be versatile. This suggests that IP need not skew the appropriability of different forms of value; however, as the role of IP in the sustainable business model has scarcely been studied, this leaves a gap in our understanding of its relationship to not just

innovation, but social and environmental value creation and capture (Hernández-Chea et al. 2020; Vimalnath et al. 2023).

This study sought to examine how sustainable ventures manage IP as part of their sustainable business model, given that social, environmental, and economic value each have their own value logics (Evans et al. 2017; Rosário et al. 2022), while IP was designed to facilitate economic value first and foremost (Bannerman 2020; Granstrand 1999). This study contributes to the nascent literature on the role of IP in sustainable innovation, sustainable business models, and sustainable entrepreneurship by highlighting developments in its use as well as limits to its practice and design. As such, recommendations are offered to improve the way IP is—and can be—used to support balanced value.

2 | Literature Review

This section first introduces sustainability in relation to IP, followed by sustainable innovation, sustainable entrepreneurship, and sustainable business models. Finally, IP is discussed in relation to (sustainable) entrepreneurship and the different value logics of the sustainable business model to examine how IP may enable or hinder the creation and capture of social, environmental, and economic value.

2.1 | Sustainability and the Triple Bottom Line

Sustainability has become a mainstay priority in management science and practice. Many research streams now address some aspect of social and/or ecological responsibility on the part of corporations (Dyllick and Hockerts 2002), in contrast with the neoclassical model of the firm wherein a firm's only responsibility is to its shareholders, and its only priority is to maximize profit and optimize growth (Stubbs and Cocklin 2008; Upward and Jones 2016). In contrast, stakeholder theory extends the firm's responsibility to those who have a "stake" rather than a "share" in the firm, which increasingly includes such voiceless nonactors as the environment, certain communities, and future generations (Lüdeke-Freund et al. 2020; Ritala et al. 2021).

However, definitions of sustainability are varied and transitory and are used inconsistently (Hallin et al. 2021; Seager 2008; Stubbs and Cocklin 2008). At minimum, most include a concern for the depletion of nonrenewable resources and the use of renewable resources at a rate higher than they can be regenerated (Alhaddi 2015), though early conceptualizations tended to overlook social dimensions like poverty and inequality (Seager 2008). Well-known and often applied is the Brundtland report's definition of sustainable development as "development that meets the needs of the present generations without compromising the ability of the future generations to meet their own needs" (1987, 43), though this definition has been criticized for its vagueness, especially with regard to the planetary boundaries, i.e., the inherent limits to the ecological system in supporting economic growth (Hummels and Argyrou 2021).

Translating the system-level concept of sustainable development to the firm level, research has adopted the concept of "corporate

sustainability” to refer to business-driven sustainable development along a triple bottom line of social, environmental, and economic value (Dyllick and Hockerts 2002; Elkington 1997; Hahn et al. 2018), and the “sustainable business model” as a way of operationalizing these corporate efforts (Evans et al. 2017; Stubbs and Cocklin 2008). Though widespread in its use, the triple bottom line has been criticized for assuming that “sustainability” is achievable at the firm level and presenting a false “win-win” relationship between different forms of value without acknowledging the systemic degradation of environmental systems as a result of unmitigated economic growth (Isil and Hernke 2017). Moreover, it has been argued that the trifecta of social, environmental, and economic value is too narrow or too general to reflect the multiplicity of sustainability in all its different dimensions and priorities (Seager 2008), while some argue that the meaning of “sustainability” is necessarily transitory and can only be defined in use (Hallin et al. 2021).

Hence, it may be possible to define sustainability only pragmatically, but not comprehensively. As suggested by the previous, one of the most problematic aspects of corporate sustainability, especially, is that many “sustainable” outcomes are not complementary, but conflicting, paradoxical, or, at worst, substitutive (Hahn et al. 2018; Hummels and Argyrou 2021; Seager 2008; Upward and Jones 2016). This means that the pursuit of sustainability is in large part a function of priorities and trade-offs, where value of every type (social, environmental, and economic) is dependent on what different stakeholders actually “value” and whether that value can be (co-)created within a firm’s value network (Freudenreich et al. 2020; Lüdeke-Freund et al. 2020). Moreover, just because value of a certain type is created, it does not follow that this value will be captured by the stakeholders that supplied the resources to create it (Ritala et al. 2021). As such, economic or social value may be created by consuming environmental resources, social and environmental value may be destroyed by economic value capture (Yang et al. 2017), and different stakeholders may outcompete one another for use of a resource that can be used to create different ends that, each in their own right, could be considered “sustainable” yet, in the aggregate, produce ambiguous results.

The triple bottom line of social, environmental, and economic value hence presents a broad operationalization of a much more complicated reality of complementary, competing, and conflicting (stakeholder) interests. It is used here for its commonality in the corporate sustainability literature, particularly with regard to the sustainable business model (Lüdeke-Freund et al. 2020; Upward and Jones 2016). However, it is acknowledged that different types of value can be variously defined (Cantele et al. 2024; Rosário et al. 2022) and that each category includes a virtually inexhaustible variety of different outcomes that are themselves in many ways complementary and competing, both within and across categories.

For now, it is noted that economic value is often defined as including such financial outcomes as profit and a return on investment, meaning that an economically sustainable corporation is cash-flow positive and therefore capable of surviving financially. Environmental value consists of the preservation of natural ecosystems and nonrenewable resources, as well as the

regeneration of renewable ones. Finally, social value typically includes community well-being and development, labor rights, fair and equitable treatment, and the development of human capital as well as opportunities for using it (Alhaddi 2015; Dyllick and Hockerts 2002; Evans et al. 2017; Stubbs and Cocklin 2008). In the final section of this literature review, different forms of value are discussed in relation to IP, noting that though value may be grouped by form or stakeholder, each includes a wide range of complementary and contradicting outcomes as related to different stakeholders within each domain.

2.2 | Sustainable Innovation, Entrepreneurship, and Business Models

This study focuses on fashion as an industry that has seen a surge of sustainable innovation, much of which is driven by startups practicing sustainable entrepreneurship (Kasana et al. 2024; Schaltegger et al. 2016). In consequence, sustainable business models that seek to address sources of unsustainability in the industry’s current business model are advanced, including a reliance on repeat sales and untransparent supply chains (Bocken and Short 2016; Lüdeke-Freund et al. 2018; Todeschini et al. 2017).

In this study, sustainable innovation is used to refer to any innovation (process, product, service) that seeks to improve the industry’s social and environmental sustainability performance. Notably, while few sustainable innovations focus equally or simultaneously on social and environmental sustainability (cf. Belz and Binder 2017; Castaldi 2021), sustainability problems are often intertwined in such a way that addressing one dimension impacts others. For instance, while reducing waste clearly impacts the local environment, it also impacts communities living in affected areas, improving living and labor conditions.

Sustainable entrepreneurship has been defined in terms of contributions to “solving societal and environmental problems through the realization of a successful business” and to “sustainable development in a more comprehensive way” (Schaltegger and Wagner 2011, 224). This definition includes society and the environment not just as important stakeholders, but as targets for development beyond the boundaries of the venture. Sustainable innovation is therefore an integral part of sustainable entrepreneurship, while sustainable entrepreneurship is an important driver of business-led sustainable development (Hummels and Argyrou 2021; Ritala et al. 2021), i.e., the sustainability transformation of markets and industries (Schaltegger et al. 2016).

Finally, sustainable business models are what actually allow entrepreneurs to create and capture social, environmental, and economic value from their sustainable innovations, mediating between an innovation and its business case (Chesbrough 2010; Lüdeke-Freund 2020; Upward and Jones 2016). In the context of the fashion industry, different drivers, patterns, and strategies for sustainable business model innovation have been highlighted, addressing sources of unsustainability in the industry’s current business model(s) (Bocken and Short 2016; Lüdeke-Freund et al. 2018; Pal and Gander 2018; Todeschini et al. 2017). For instance, Bocken and Short (2016) suggest sufficiency as a counter to the industry’s excessive consumption and hence

production and waste. Likewise, Pal and Gander (2018) identify narrowing, slowing, and closing as logics that inspire sustainable business model innovation, for instance, by reducing material waste, improving durability, and closing the loop through recycling.

Meanwhile, research on sustainable entrepreneurship suggests that startups can, and indeed should, aim for designing business models that achieve hybrid social, environmental, and economic outcomes. This means that outcomes are integrated rather than achieved in parallel, through separate value propositions (Muñoz and Cohen 2018). Hence, social and environmental interests are designed to be complementary, if not integral, to market success (Dean and McMullen 2007; Schaltegger and Wagner 2011), meaning social and environmental value are created and captured on equal footing with economic value (Davies and Chambers 2018; Evans et al. 2017).

Research has consequently studied how the value logics of sustainability can be combined with traditional, commercial value logics within sustainable business models, identifying areas of tension and complementarity (Laasch 2018). Tension may reside within the value capture component specifically (Davies and Chambers 2018; Laasch 2018; Lüdeke-Freund 2020), as economic value capture can hinder the creation and capture of social and environmental value. This explains IP's contested role in sustainable innovation, as IP can be used to prioritize economic over social and environmental value creation and capture. IP may erect barriers to use, adoption, diffusion, and imitation of intangible resources and limit the spread of sustainable innovations and business models (Athreye et al. 2023; Henry and Stiglitz 2010; Schaltegger et al. 2016). Additionally, IP may direct time and resources away from social and environmental value creation to focus on attaining IP rights (IPRs) and appropriation mechanisms that enable ventures to profit from their innovation.

In the following, the role of IP in entrepreneurship is briefly discussed to provide a context for the unique IP considerations that ventures find themselves confronting. Next, IP is discussed in relation to the triple bottom line of social, environmental, and economic value as hybrid components of the sustainable business model.

2.3 | The Role of IP in Sustainable Entrepreneurship and the Sustainable Business Model

When reference is made to IP rather than IPRs, it is at times unclear whether this includes formal rights only (Candelin-Palmqvist et al. 2012). In this study, IP is meant to refer to those intangible assets whose use and access are controlled through either formal IPRs, i.e., patents, trademarks, copyrights, or informal appropriation mechanisms, including secrecy, lead times, and complexity of design (Holgersson and van Santen 2018; Morales et al. 2022; Zobel et al. 2017).

While IP is important to all innovators, it is especially so for ventures, as IP is often their main, if not their only asset (Vimalnath et al. 2022). In its various forms, IP helps startups

gain credibility (Holgersson 2013; Lounsbury and Glynn 2001), obtain investment and licensing revenue (Audretsch et al. 2012; De Rassenfosse 2012), and protect against imitation (Thomä and Bizer 2013). However, ventures often find themselves at a disadvantage when it comes to obtaining and enforcing formal IPRs (Audretsch et al. 2020; Hanel 2006; Holgersson 2013) or building complementary assets in the absence of IP (cf. Teece 1986). As far as appropriation is concerned, ventures therefore often prefer informal mechanisms over formal rights (Thomä and Bizer 2013) and seem to do so in the context of sustainable innovation as well (Hirschmann and Block 2022).

Sustainable innovation creates tensions however, as IP can be both an incentive (Castaldi 2021; Eppinger et al. 2021) and an inhibitor (Athreye et al. 2023; Bustamante et al. 2023; De Rassenfosse and Palangkaraya 2023; Henry and Stiglitz 2010). In this context, research has found that firms do adapt their appropriation strategies to the requirements of sustainable innovation (Jain et al. 2024). Less restrictive appropriation mechanisms may be preferred, including lead times (Morales et al. 2022), and different motives may drive the selection of one appropriation mechanism over another. For instance, firms may decide not to patent an innovation if doing so is thought to hinder sustainability outcomes (Morales et al. 2023). Finally, startups incorporate more openness in their IP management towards the commercialization stage in order to promote diffusion (Vimalnath et al. 2022).

Building on the previous, it can be argued that IP plays an integral, varied, but as of yet poorly understood role in the sustainable business model (Hernández-Chea et al. 2020). Specifically, though IP is intrinsically related to economic value creation and capture in the commercial business model, it is still unclear how IP relates to social and environmental value creation and capture. On the one hand, profiting from innovation is an important part of the sustainable business model that IP actively contributes to (Lüdeke-Freund 2020). As such, IP supports the venture's ability to create social and environmental value in accordance with its value proposition by enabling "business as usual" (Matzembacher et al. 2020). On the other hand, IP may hinder social and environmental value creation and capture in a broader sense by enabling private, economic value capture at the cost of value exchange and redistribution (Freudenreich et al. 2020; Laasch 2018).

What is currently unclear is whether ventures operating sustainable business models manage their IP differently to not just enable sustainable innovation, but to achieve a balance between different forms of value. Specifically, most of the literature on the role of IP in corporate sustainability has studied it in relation to sustainable innovation (cf. Athreye et al. 2023; Castaldi 2021; Henry and Stiglitz 2010; Jain et al. 2024; Morales et al. 2023). Though naturally important for sustainable development, innovation by itself produces only knowledge and technology, not value, while the value created and captured from this knowledge is a function of, among other things, the business model in which it is used (Chesbrough and Rosenbloom 2002; Lüdeke-Freund 2020; Teece 2010). By only relating IP to the development of innovation rather than its use in the sustainable business model, the role of IP is therefore simplified, and its contributions to enabling and/or hindering value creation and

capture obscured (cf. Hernández-Chea et al. 2020; Vimalnath et al. 2022, 2023).

Noting that empirical work on the role of IP in sustainable entrepreneurship and the sustainable business model is lacking (Hernández-Chea et al. 2020), this study contributes by examining the IP decisions of sustainable ventures in the fashion industry and relating them to the creation and capture of economic, social, and environmental value as part of the sustainable business model. To this end, this study builds on the “motive” construct, which has to date been used in the literature on IP and appropriation to show how the role of IP in the commercial business model has waxed beyond appropriation only (cf. Blind et al. 2006; Holgersson 2013; Olander et al. 2014; Veer and Jell 2012). Using motive to study the role of IP in the sustainable business model highlights the ways in which the use of IP has remained the same and how it has changed with the added responsibility of creating and capturing social and environmental in addition to economic value (cf. Morales et al. 2023). As a final note, the following section discusses (the design of) IP in relation to different forms of value.

2.4 | Value Logics and IP

Relevant in relating IP to value creation and capture of different kinds is Ritala et al. (2021), who link social, environmental, and economic value to different types of economic goods to elucidate asymmetries in terms of value creation and capture. Hence, they argue that economic value is commonly created and captured in the form of private goods subject to private property rights, including most common use goods. Social value is created and captured through public goods that are shared across communities, such as education. Lastly, environmental value is created and captured through common goods or natural resources. These goods differ in terms of their excludability of use and rivalry of consumption, which has an impact on where value can be created and captured (e.g., creation of private goods consumes social and environmental resources but results in economic value capture only), which in turn has an impact on the applicability and efficacy of IP.

That is, IP in the form of both formal IPRs and informal appropriation mechanisms was designed to support the creation of intangible capital (Dyllick and Hockerts 2002), including technology and know-how, by awarding temporary monopoly rights that allow an innovator to recuperate the cost of their innovation (Granstrand 1999). As such, it is an artifact that promotes value *creation* by enabling value *capture*, by making a rival good (opportunities for appropriation as related to innovation) excludable. As an ownership right accruing to innovators (or rather, the right to sue), it is most applicable to private and corporate inventors creating private goods, i.e., innovation or knowledge resources, for which ownership can be ascribed to a single actor.

Less common is for IP to be used for public goods where social value may be created and captured and where ownership rights are held at the level of the collective. Notably, this includes such resources as open source where consumption is non-rival and non-excludable, at least within the collective (Bustamante et al. 2023; Contreras et al. 2020; De Rassenfosse

and Palangkaraya 2023; O’Mahony 2003). Environmental value creation and capture involving common goods is (mostly) non-rival yet excludable, and largely dependent on non-agentive, nonhuman stakeholders, which makes ownership rights such as IP hard to ascribe except where resources are overlapped by organized community and/or corporate interests (who control excludability) (Argyrou and Hummels 2019; Lüdeke-Freund et al. 2020; Meyer and Naicker 2023). While IP is hence ontologically tied to economic value creation and capture, the introduction of social and environmental value creation and capture as corporate responsibilities, and indeed autonomous ends (Dyllick and Hockerts 2002; Hahn et al. 2018; Upward and Jones 2016), presents new opportunities and challenges for firms and the stakeholders in their value networks (cf. Bannerman 2020; Meyer and Naicker 2023).

For one, though IP can be organized at the level of the collective, this option is currently restricted to those collectives that can either organize themselves corporately (in the case of formal IP, e.g., creating commons through patent pools or pledges) or effectively govern access and use both within and across the collective’s boundaries, i.e., enforce their (formal and informal) IP. In a commercial business model, these restrictions are not prohibitive, because only economic value is created and captured; hence, options for value creation and capture need to be enabled for corporate actors only. However, in a sustainable business model, value is created for and captured by a value network consisting of economic, societal, and environmental actor and non-actor stakeholders for whom “value” has idiosyncratic meaning (Freudenreich et al. 2020; Lüdeke-Freund et al. 2020). Hence, a collective may or may not be able to use IP due to the nature of its (non)actors, or the value it creates and captures. Where social value is created from a resource that is used in *economic* value creation as well, corporate actors can moreover use IP to destroy social value (Yang et al. 2017), for instance, where corporate actors seek to patent or trademark cultural knowledge and prevent its use in its original context.

Meanwhile, environmental value creation and capture is a function of the protection and renewal of ecological resources. Notable in this regard is that economic growth consumes environmental resources at a fundamentally unsustainable rate, which begs the question whether economic and environmental value creation can be unproblematically complementary (Hummels and Argyrou 2021; Isil and Hernke 2017; Upward and Jones 2016). It has consequently been noted that there is a limit to the “business case” for corporate sustainability and indeed sustainable innovation (Hahn et al. 2018), meaning innovation contributes only to environmental value creation from a strong sustainability perspective insofar as environmental restoration, and not just preservation, is given precedence over economic growth.

From this perspective, IP contributes to environmental value creation and capture where it is used to enable the development and diffusion of innovations that help preserve and restore natural resources (Pihlajarinne and Ballardini 2020; Vimalnath et al. 2022). Yet it is precisely in this context that the necessity of IP has been questioned (Athreye et al. 2023; Henry and Stiglitz 2010). Specifically, where IP provides a financial incentive to engage in “green” innovation, economic value capture,

e.g., in the form of commercialization of green products and technologies, may assume dominance over environmental value creation. As such, IP plays an integral role in the “business case” for sustainability, yet where business case thinking is itself harmful to strongly sustainable firm outcomes, IP may contribute to institutionalized asymmetries by enabling economic value capture from environmental value creation. Finally, though social value may be created and captured by agentic societal actors, environmental value is dependent on (collective) intermediaries (Lüdeke-Freund et al. 2020; Ritala et al. 2021). This means that environmental stakeholders are not able to create or capture value for themselves and that societal and corporate actors *need* to be incentivized to create value on their behalf. Where the primary incentive is financial, asymmetries may persist.

As such, interchangeability between different forms of value, meaning that different kinds of value can be created from the same resource, implies that one type of actor having an advantage with regard to appropriating this resource disadvantages other actors by proxy, i.e., appropriability regimes are interdependent (Holgersson et al. 2018). While Ritala et al. (2021) link these asymmetries to excludability and rivalry of consumption, the previous aimed to show that IP as a means of creating excludability can either contribute to or, potentially, aid in overcoming asymmetries. How these potentials actually manifest in use, however, is currently unclear.

Notably, the literature on sustainable business models has often assumed that where value is created, it will be captured by the relevant stakeholders, hence overlooking the appropriability of social and environmental actors especially (Lüdeke-Freund et al. 2020). Meanwhile, the literature on appropriability has mostly overlooked social and environmental value to focus on economic value exclusively (Ritala et al. 2021). Finally, as mentioned previously, the literature on IP has focused on relating IP to sustainable innovation, overlooking its role in the creation and capture of value (Hernández-Chea et al. 2020). Hence, there is a gap at the intersection of these different streams of research that this study seeks to address.

3 | Methods

This study used a qualitative research design based on semi-structured interviews with founders of sustainable startups operating in the fashion industry. Sampling focused on a single industry in order to improve comparability of the findings (Davidsson and Gruenhagen 2021). Meanwhile, the fashion industry was chosen for its enduring sustainability issues, which have in recent years spurred a surge of regulation and innovation (cf. Niinimäki et al. 2020).

3.1 | Sampling and Data Collection

Sampling was theoretical, meaning ventures were selected from across the value chain to include a representative variety of sustainable innovations and business models. Startups were included in the sampling frame if they had been identified as a sustainable fashion startup by credible sources such as sustainability platforms, universities, sustainability contests,

incubators, accelerators, and venture capitalists according to online publications. As such, sampling included many high-profile startups that were targeted at the risk of overlooking similarly promising but less extensively marketed enterprises. Given that the fashion industry spans many different technological fields and industries, i.e., is not limited to textiles only, this (self-)identification as a sustainable fashion startup was used to single out startups who explicitly aimed their attempts at sustainable development in the fashion industry (cf. Schaltegger and Wagner 2011) and were thus more specifically relevant to this study.

Startups were contacted via email and included in the sample if they consented to at least one 30-min interview with the opportunity for a follow up. Interviews followed a set topic guide and were transcribed and coded while data collection took place to allow for validation of themes between rounds. This meant that follow-up interviews were used to probe the relevance of themes emerging from the first round of interviews. Sampling continued until saturation had been achieved in terms of the technologies, value propositions, and value chain positions included in the sample, meaning that additional sampling did not add additional diversity in terms of (types of) sustainable innovations and sustainable business models. This resulted in a total of 37 interviews with 24 different startups while one startup consented to answering questions via email alone.

It should be noted that, though efforts were made to acquire a representative sample of innovations and business models, startups that made more active use of IPRs in their business model were by and large more receptive to taking part. As a result, there was a risk of selection bias, as it was easier to sample sustainable business models of the technological archetype as opposed to the social and organizational archetype (Bocken et al. 2014), i.e., startups based on technological innovation. To mitigate this, purposive sampling was used to supplement ventures using social and organizational sustainable business models to result in a more balanced sample. Nevertheless, the sample obtained likely ascribes greater importance to IP and relies more heavily on technological innovation than a completely representative sample of sustainable entrepreneurship in the fashion industry would have.

For instance, sustainable business models that rely on business model innovation only, such as renting models (cf. Arrigo 2021; Pal and Gander 2018), are unlikely to use much or any IP, yet they form an important component of “sufficiency” in the fashion industry (Bocken and Short 2016). Transferability of findings may therefore be limited to business models that more actively make use of IP, while those that do not face different dynamics in terms of value creation and capture. However, it has likewise been noted that such social and organizational business models as renting models are often judged by the standards of technology-based ventures by their stakeholders, including investors (Andersson Wänström et al. 2025), hence some of the communicative aspects of IP may be relevant even to these ventures. Notably, it is not unlikely that technology-based ventures have a clearer *vision* of what (their) IP is, meaning that IP takes on a different form and perhaps a different role for ventures of the social and organizational archetype. These forms and functions may hence

be underrepresented in this study, highlighting an important area of future research in both IP and sustainable business model innovation, as even a business model innovation can itself constitute IP (Massa and Tucci 2013).

An overview of the data gathered can be found in Table 1, including information on respondents, interview duration, country of origin, and type of innovation. For the sake of confidentiality, often experienced as especially important in the context of IP and specifically requested by a number of respondents, startups were anonymized both in the table and in the continuation of the paper.

As interviews were semi-structured, respondents' answers guided the progression of interviews beyond the initial topic guide, to a lesser extent in initial interviews and to a larger

extent in follow-ups. First-round interviews hence focused on ventures' technologies, business models, and IP decisions, while subsequent interviews focused more specifically on (tensions between) different outcomes, including caveats and trade-offs in terms of IP management.

3.2 | Data Analysis

Following data collection, interviews were transcribed and analyzed with the help of NVIVO software. First, each startup's IP decisions were coded in vivo, meaning that initial codes adhered closely to descriptions as given by respondents themselves, resulting in a large number of highly contextualized codes. Over multiple iterations, codes were then compared and aggregated across interviews in order to identify common

TABLE 1 | Data overview.

No.	Interviews and duration	Country	Sustainable innovation and business model
1	Head R&D; 1 interview, 40 min	Sweden	Sustainable materials/recycling
2	Co-founder/COO; 2 interviews, 50 min	Sweden	Dyeing/recycling
3	Founder/CEO; 1 interview, 52 min	Germany	Repair/reuse/clothing culture
4	Co-founder/marketing and PR; 2 interviews, 58 min	Netherlands	Platform/transparency/sustainability data
5	Co-founder/managing partner; 1 interview, 39 min	Netherlands	Sustainable materials/recycling/clothing culture
6	CFO; 2 interviews, 68 min	Netherlands	Platform/design /production/sourcing
7	Founder/CEO; 2 interviews, 89 min	Spain	Materials sampling/production
8	Founder; 1 interview, 60 min	Italy	Design/clothing culture
9	Founder/CEO; 1 interview, 29 min	United Kingdom	Tracing/transparency
10	Founder; 1 interview, 25 min	United States	Sustainable materials
11	Co-founder/CEO; 2 interviews, 69 min	United States	Sustainable materials
12	Co-founder/CEO; 1 interview + 1 email interview, 30 min	Chile	Recycling
13	CTO; 1 interview + 1 email interview, 28 min	Switzerland	Transparency/sustainability data
14	Co-founder/CTO; 1 interview + 1 email interview, 30 min	Denmark	Sustainable materials
15	Co-founder/head of product; 1 interview + 1 email interview, 25 min	Germany	Sustainable materials
16	CEO; 1 interview, 26 min	Hong Kong	Transport/protection
17	Technical lead; 2 interviews, 55 min	Finland	Protection/sustainable materials
18	Co-founder/CEO; 2 interviews, 65 min	India	Dyeing
19	CEO; 2 interviews, 58 min	Austria	Sustainable materials
20	Co-founder/CEO; 1 interview, 28 min	India	Sustainable materials
21	Co-founder; 1 interview, 52 min	United Kingdom	Showroom/clothing culture
22	Co-founder/CEO; 2 interviews, 68 min	Italy	Sustainable materials
23	Product development; 1 interview, 29 min	Italy	Dyeing/recycling
24	COO/director of development; 1 email interview	United States	Sustainable materials

themes. This meant that similar motivations and decisions were grouped until decision-level codes were identified where each decision was referenced by multiple respondents. From these decision-level codes, two types of information could be gleaned: the type of IPR or appropriation mechanism used and the venture's reason for using it. When a decision was driven by multiple reasons, this decision was coded once for every reason given.

Finally, in-depth discussion of the impact of ventures' IP decisions yielded codes that notably linked descriptions of motive at a higher level of abstraction to the operation of ventures' business models. That is, when asked to reflect on the function of their IP, ventures described the motives they had earlier brought up in relation to individual IP decisions at a more strategic level, as related to different commercial and sustainability outcomes. Iterative coding and aggregation of these descriptions hence resulted in codes describing the chief motives driving ventures' IP management, which were subsequently linked to the earlier derived decision-level codes to show how individual decisions served higher level motives.

An overview of this analysis can be found in Tables 2 and 3 and Figures 1 and 2 in Section 4. Table 2 summarizes the results

from coding and relates them back to motives commonly known in the appropriation, innovation, and entrepreneurship literature. Figure 1 describes these existing motives to show how their assumptions have been incorporated, and transformed, in the motives identified as part of ventures' sustainable business models. Table 3 compares commercial and sustainable business models to show the evolution in the role of IP, while Figure 2 models how different motives relate to social, environmental, and economic value creation and capture, highlighting tensions and trade-offs.

It should be noted that analysis focused on value creation and value capture to the exclusion of other business model components such as the value proposition, value delivery, and value exchange for reasons of relevance and analytical simplicity. That is, while IP can at times play a role in shaping or enabling a startup's value proposition, it is usually most relevant in creating and capturing the value proposed. Moreover, while IP can be highly relevant in the delivery and exchange of value, it can be hard to disentangle its relationship to these functions from its relationship to value creation in a more general sense. Hence, for the purpose of this study, only value creation and value capture were considered as the most relevant and representative components of the sustainable business model likely to be impacted by IP.

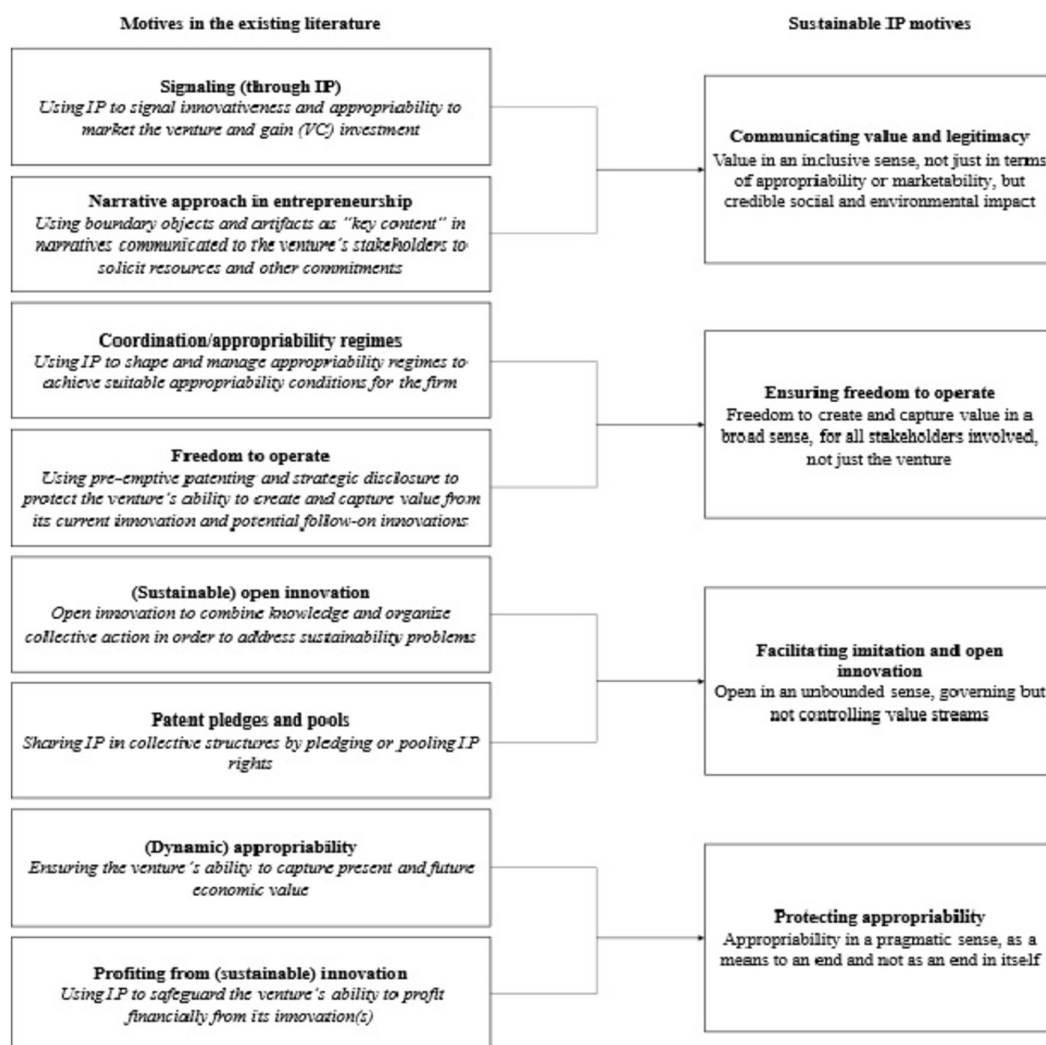


FIGURE 1 | IP motives in relation to the existing literature.

TABLE 2 | Coding table.

Decision	Coding example	Type of IP	Motive
Gaining credibility for new technology	<p>"I mean the old-fashioned technologies are very efficient, but they have this sustainability problem. So we take care of the sustainability but we also need to meet the technical requirements." (interview 17.1)</p>	Lead times	Communicating value and legitimacy <i>Signaling through IP</i> (e.g., Audretsch et al. 2012; Colombo 2021; Holgersson 2013)
Marketing sustainability to distinguish oneself	<p>"Even if you talk about big brands, they are producing a very limited collection in sustainability. But then, you know, the depiction of what they have done is almost 100 times more compared to what they have done." (interview 18.2)</p>		<i>Narrative approach in entrepreneurship</i> (e.g., Garud and Giuliani 2013; Lounsbury and Glynn 2001; Vaara et al. 2016)
Patent as inventory of value and know-how	<p>"Especially in the beginning, very early at the start, you probably go for a lot of IP applications that may not be a 100% building of what you had envisioned but it is an inventory of value and an inventory of knowhow because your business model is not fully developed." (interview 19.2)</p>	Patenting	
Patent as signal of innovativeness for investors and other stakeholders	<p>"Investors usually ask, 'yeah, we have a patent' or 'no' and then they are like 'oh then there's nothing interesting'." (interview 2.1)</p> <p>"It adds some value that it has been patented because your customers understand that this really is something new and it has potential." (interview 17.1)</p>		
Patenting for credibility	<p>"Also whenever you have IP it creates a lot more credibility for your company, compared to if you do not have any IP." (interview 18.1)</p>		
Patenting to claim innovation	<p>"Then when the patent is open and somebody can do something with the patent and also develop something this is not something I'm going to be closing [...] What we want to say is just 'respect that we are the first' and it gives a better reputation that we know best how to do it." (interview 7.1)</p>		
Publishing to show your innovation	<p>"You have different types of scientific papers. [...] and all of this will fulfil in the field of IP very different roles. So while the review paper is just showing that you work on this field and that you know this field, the other two pieces are more concrete examples of your research." (interview 19.2)</p>	Publishing	
Industry with culture of market intelligence	<p>"It's very common as a product developer or designer to write on your CV that you have experience in comp-shop. Comp-shop, a provision for comparative shopping, meaning the practice of going to your competitor's stores, buying or taking a garment to the fitting room, taking photos or buying that garment and sending it to a factory and saying 'I want this but in green.'" (interview 13.1)</p>	Secrecy	
Design side of fashion uses little formal IP	<p>"In fashion the designs aren't protected so if I create something very amazing-looking, you can copy it. I think only the names, so the trademarks are protected, and in general in the startup world, of course it's very hard to protect, everybody is copying everybody unless you really have hardcore IP." (interview 3.1)</p>		
Secretive industry	<p>"As far as fashion is concerned, it is a very interesting space because the whole industry is secretive, right? And I do not really believe that it's secretive about their supply chain and all that, I think it's just sloppiness, that you do not know where it is. As far as ideas [go]—that is, and so by nature, the industry is secretive, and not collaborative." interview 11.1</p>		

(Continues)

TABLE 2 | (Continued)

Decision	Coding example	Type of IP	Motive
Trademark for credibility and distinction	<p>“The trademark is the face of your credibility together with the product. So if the trademark is associated with a real transparent supply chain and the way to prove what you are claiming then the trademarking—and also it’s protectable.” (interview 22.1)</p>	Trademarks	
Trademark to identify and distinguish a technology	<p>“I think the trademark [...] has played for us the bigger role because that’s at the end of the day what the brand looks like on the label or on the tag that makes the products containing our materials different from any other fabrics. So for us, associating IP with an ingredient-branding marketing strategy was super useful.[...] if you want to be an ingredient, you need to be recognizable, and the trademark in that was super useful.” (interview 22.1)</p>		
Controlling part of the value chain	<p>“We’re developing the business model so we can have control over the value chain so nobody can do what we do or take over parts of what we are providing. [...] and it’s also to be able to lock in customers, and lock in actors so they cannot mimic what we are doing and take parts of the value chain that we are in control of.” (interview 2.1)</p>	Lead times	Ensuring freedom to operate <i>Coordination/appropriability regimes</i> (e.g., Holgersson et al. 2018; Hagedoorn and Zobel 2015; Somaya et al. 2011; Zobel and Hagedoorn 2020)
Creating market share rather than fighting over it	<p>“Five minutes ago, there was no market for what we did. When we first spoke to companies about environmental impact measurement—they did not care, they did not believe it would be a thing. Now it’s a thing, now the market is being created, right? So at this evolutionary state of the market, the VCs of us care about market share, protection comes later.” (interview 13.1)</p>		
Not patenting to maintain speed	<p>“I guess the additional argument would be that you know the patent process is long, it’s expensive, we have only been around for a year so it’s distracting as well.” (interview 12.1)</p>		
Not patenting when technology is not enduringly relevant	<p>“Because you know, by the time we get the patent granted, we may say like, oh we are not even going there, we are going to something else, or something happened, we are pivoting and doing something different.” (interview 11.2)</p>		
Patenting to prevent being blocked	<p>“If we were to create new IP, or new patents, it would be to make sure that we are not blocked. [...] It’s more about having it here and having it published so nobody can block us.” (interview 15.1)</p>	Patenting	
Commons type of ownership structure	<p>“What we would want is to have some kind of collective property, with some kind of cooperation or community, like a commons. [...] So with parties that work according to principles we decide so that we can have the IP together but can still arm ourselves against those that would misuse it. Because we’d be afraid that if we did not do that, parties that’d get the IP under regular market conditions would strive for as low a price as possible or bad labour conditions.” (interview 5.1)</p>	Publishing	
Publishing to prevent others from patenting	<p>“It really might be that we see that going through a patenting process would not yield the effect that we want for the company, but at least we want to publish it. So really to avoid others to be able to transform that into IP. Because you are never sure. You have a piece of the puzzle, but someone else has another piece of the puzzle. So this is also to keep others at bay or at arm’s length.” (interview 19.2)</p>		

(Continues)

TABLE 2 | (Continued)

Decision	Coding example	Type of IP	Motive
Costliness of patent applications	<p>“But honestly everything would be easier if you did not have to come up with IP because IP costs a lot of money and it’s a long procedure—it costs a lot and then you have to wait for approval, right, and then they give you some comments, they do a uniqueness search, and so on.” (interview 10.1)</p>	Secrecy	
Hard to enforce IP as a startup	<p>“Because protection is more about enforcement at the end of the day. The fact that you have a second patent is fine, but the reality is that you also need to invest in really enforcing it. And this is not so easy, so that’s the part that might be more complicated for us.” (interview 22.2)</p>		
Patenting vaguely to keep knowhow secret	<p>“So of course you need to give like enough detail in the patent to satisfy the official requirements within it. But that can still be done without saying exactly which molecules you use and only like describing the main features of the molecules. And when you then use, say, 5 different molecules and the way you describe each molecule allows for 5, 6, 7 different options, you suddenly get a lot of combinations, making it very hard to replicate based on the patent.” (interview 14.1)</p>		
Concept inspires many different applications	<p>“If we have a new material that can do all these things—I mean I’m a designer and my co-founder is an architect so we have some kind of imagination—but there are people that are imagining things beyond what we can do.” (interview 11.2)</p>	Lead times	Facilitating imitation and open innovation (Sustainable) open innovation (e.g., Bogers et al. 2020; McGahan et al. 2021; Radziwon et al. 2022; Vimalnath et al. 2022)
Unable to protect concept	<p>“Even when you are doing patents, you know, you will not be able to stop anyone replicating it. So Apple introduced the smartphone, but now Samsung, OnePlus, everybody sells smartphones. There will come a point when there will be other companies who will be there out in the market and you know the products will be much cheaper, because they have a direction.” (interview 18.1)</p>		<i>Patent pledges and pools</i> (e.g., Contreras et al. 2020; De Rassenfosse and Palangkaraya 2023; Ehrnsperger and Tietze 2019)
Patenting in order to license and spread the technology	<p>“Every year about a hundred million tons of textile fibres are made. [...] So in order for us to make any dent we would have to build gigantic plants. And for us to do it, it would take years and years and years, so we believe that we can license our technology to many companies that are looking like, you know almost anybody that’s doing any fibre—fashion companies, textile manufacturers, are looking for more sustainable ways of doing their business.” (interview 11.1)</p>	Patenting	
Patenting to inspire imitation	<p>“Maybe there are some companies who would like to use our patent and that’s fine. [...] Because we patented like one thing, our method, and another story is our device and we will not stop people producing devices that do this. For us it’s the opposite [...] we explain what kind of device it needs to be, what’s the best for this method, and different directions you might take, because it’s not necessary to use the device in the way we are using it.” (interview 7.1)</p>		
Patenting to prevent stealing in collaboration	<p>“For one you would need to have protected IP, very well-protected, and then collaborate with the big chemical that help you scale up the production [...] when you go with the help of the big chemical companies, because they have the big facilities, they have sometimes processes that are similar to yours [...] you have to have very protected IP.” (interview 10.1)</p>		

(Continues)

TABLE 2 | (Continued)

Decision	Coding example	Type of IP	Motive
As much transparency about methods as possible	<p>“We’re actually always very open when people ask like ‘can we have this’ and if we think that this is for the greater good then we are always very chill about that. For instance we are currently working with [partner] and they are using our entire product API and there’s a lot of time and effort in that as well of course, but they are using it as an unpaid SAAS.” (interview 4.1)</p>	Publishing	
Open source to share the technology	<p>“I think that if we had a choice and we were not really relying on investors, we would probably choose secrecy until a certain point. Until we were in a place where we could just open source what we are doing [...] we believe that what we have has such an amazing opportunity to change the world that we do not want to keep it to ourselves.” (interview 11.2)</p>		
Prompting imitation to challenge the industry	<p>“My thought has always been: anyone who wants to copy is allowed to copy, because that’s how you get things moving.” (interview 5.1)</p>		
Secrecy with clients	<p>“It would be a collaboration—of course we have secrecy agreements also, so NDAs in place at least in the beginning with all our main clients, but of course we want now to keep the samples away from our competition as long as possible.” (interview 17.1)</p>	Secrecy	
Hard-to-imitate business model	<p>“Our IP is much more in the bringing together of many different fields of expertise and the fact that how we did that is not identifiable even for individual people with us because there are different blocks of knowledge that we bring together in one. And there’s software in that but also machine settings, and like how the fabric behaves, so there are many elements, knowledge, but also physical programming.” (interview 6.2)</p>	Lead times	Protecting appropriability (<i>Dynamic appropriability</i>) (Ahuja et al. 2013; Hurrelman-Laukkanen and Yang 2022; Thomä and Bizer 2013) <i>Profiting from (sustainable) innovation</i> (Cohen et al. 2000; Pisano and Teece 2007; Morales et al. 2022, 2023; Teece 1986, 2018)
Lead times through data volumes	<p>“But copying me, one-to-one what we are doing, and surpassing us from that perspective will require simply being able to get to more data than we do and that’s a function of time. And so this is my biggest protection.” (interview 13.1)</p>		
Staying ahead	<p>“So in a sense, we are not so worried about IP because we believe that we can keep reinventing and changing and moving it in different directions.” (interview 11.2)</p>		
Patenting for survival	<p>“We could make an open source and then we would also have to close right after that, because we do not have the scaling that the major chemical corporations have. Meaning that they can just produce it at a much lower price than we can and then it’s over and out for [venture].” (interview 14.1)</p>	Patenting	
Patenting for protection against imitation	<p>“I think when you have got like five clients no-one really cares, but if you got 50 someone might just plough more money into it and go for it. So I think protecting at some length—you have to start doing that now. Patents take multiple years, so if we start today we’ll have one in a couple of years or a year.” (interview 9.1)</p>		
Patenting in order to license and scale up	<p>“I really see this as a crucial tool to have. So to license out our whole patent family or patent portfolio. [...] we have been discussing quite much regarding publishing or giving it to an open source. [...] But still we have been discussing it—the licensing package may be more attractive although we may have patented also the things that we have been discussing to be open source.” (interview 1.1)</p>		
Patenting to gain lead times	<p>“For us it was really important to patent just for protection—really as like a first—so that what we are doing, nobody is doing it at least for the first few years, to get to develop this tech and to scale it up completely and to reach the market etc.” (interview 15.1)</p>		

(Continues)

TABLE 2 | (Continued)

Decision	Coding example	Type of IP	Motive
HR-based secrecy	“We definitely protect our machine learning algorithms. We do not have it patented. But we do take a lot of care of who has access to them and we have a ton of security features around them and like even within our team like a few select people who can actually use them.” (interview 12.1)	Secrecy	
Proprietary software	“Factually they are all existing things with secrecy and a few more proprietary software elements that we have combined into an IP structure.” (interview 6.2)		
Protection through vagueness	“The only method I was using was not saying clearly what we were doing. [...] Many times [...] I was telling less than what we are doing [...] and they do not feel so much like one day we'll become competition or something. They do not see disruption in the entrance of our technology, they trust you more.” (interview 7.1)		
Secrecy to gain lead times	“So sometimes for startups to progress faster, it's better to keep things quiet, go with a trade secret. Just to be smart in formulating your materials, know with whom you are working and at a certain stage start organizing your IP.” (interview 10.1)		
Trademarks for claiming and branding	“We've been working a lot with trademarks to be able to build something and spread the word about circularity because it's needed. So even though we want to have the benefits from our own trademark, our own brand, we also want to inspire the industry to be able to basically invest more into sustainable innovation.” (interview 2.1)	Trademarks	

Coding was performed by a single researcher, though codes were discussed at different points in the study with both other academics and practitioners, notably participants in the study, to check relevance and establish patterns. This meant, however, that inter-rater reliability could not be established. While this is desirable for a qualitative, inductive methodology (Corbin 2017; Glaser 2014), the wealth of in vivo codes and the many steps involved in aggregating them to the level reported meant that adding additional researchers to the analysis constituted an investment that time and resource constraints prevented. By providing extensive coding examples and carefully outlining each step in the analysis culminating in the results, an attempt was made to supplement validity with transparency.

4 | Results

As can be seen in Table 2, decision-level codes included information on the type of IPR or appropriation mechanism used and ventures' reasons for using it. Hence, startups commonly made use of lead times (a.k.a. lead-time or first-mover advantage), patents, publishing, secrecy, and trademarks. Design rights and copyrights were not included as they had not been explicitly mentioned. Moreover, complexity of design was included under “secrecy” as respondents themselves referred to it as a component of their overall secrecy strategy.

As mentioned, this study borrowed the “motive” construct from the appropriation literature to compare the functions fulfilled by IP in the sustainable business model with those found in the existing literature in relation to the commercial business model. Hence, four motives were abstracted from ventures' IP decisions: communicating value and legitimacy, ensuring freedom to operate, facilitating imitation and open innovation, and protecting appropriability. Though derived inductively, these built on and were consequently linked with traditional, commercial IP motives, as can be seen in Figure 1.

In the following, each motive is discussed in turn, focusing on the way the existing literature has described similar motives and how assumptions were found to have changed in the context of sustainable entrepreneurship. Specific attention is hence paid to differences in the use of IP between commercial and sustainable business models. Finally, propositions were formulated to summarize each motive's contribution to a reconceptualization of the role of IP.

4.1 | Communicating Value and Legitimacy

A principal driver behind many IP decisions was the need to establish legitimacy and signal value to relevant stakeholders, including investors, collaborators, and customers. Patents were used to signal innovativeness and appropriability towards investors in particular, while trademarks were thought to fulfill an important marketing function, and lead times and publishing could distinguish a venture as a leading innovator. As such, many aspects of this motive are relevant to commercial and sustainable business models both.

TABLE 3 | Evolution of IP motives from commercial to sustainable business models.

Commercial business model	Sustainable business model
<p>Communicating value and legitimacy <i>Complementarity between models—additive forms of value</i></p>	<p>The venture's value lies in its ability to create and capture inclusive value</p>
<p>The venture's value lies in its ability to turn a profit/make a return on investment</p>	<ul style="list-style-type: none"> • By establishing legitimacy, IP helps prove the value of sustainable innovations, enabling an (disruptive) impact to established markets. • The aim is to appear both credible and reliable, with innovations that create legitimate social and environmental value yet hold up to the standards of the industry's established business models.
<p>Ensuring freedom to operate <i>Mostly friction between models—trade-offs between forms of value</i></p>	<p>Focus on the value being created and captured regardless of which stakeholder does</p>
<p>Focus on the venture and its ability to create and capture value from its innovation</p>	<ul style="list-style-type: none"> • Ventures use IP to safeguard their ability to create economic, social, and environmental value from their innovation. • Safeguarding social and environmental value creation means, however, that sometimes the venture uses its IP to prevent the creation and capture of economic value. While making knowledge proprietary may hence protect a venture's ability to create economic value, the venture may instead make this knowledge public to protect a collective ability to create social and environmental value without being prevented by commercial interests.
<p>Facilitating imitation and open innovation <i>Mostly complementarity between models—addition and trade-offs between forms of value</i></p>	<p>Sharing knowledge improves the ability of the whole value network to create and capture value.</p>
<p>Sharing knowledge helps the venture and its collaborators develop and diffuse innovation.</p>	<ul style="list-style-type: none"> • IP provides knowledge protection to facilitate knowledge sharing, enabling collaborative innovation to find solutions to complex sustainability problems and ensuring that economic value is created and captured by the participants. • IP can also be used to disclose, pool, or share knowledge to promote mimicry and general acceleration of sustainable innovation. • Hence, knowledge may be shared with no designs on creating or capturing economic value. In doing so, spillover value may be captured by society and the environment in the form of, for instance, collective knowledge or stewardship over natural resources.

(Continues)

TABLE 3 | (Continued)

Commercial business model	Sustainable business model
<p>Protecting appropriability <i>Mostly friction between models—addition and trade-offs between forms of value</i></p>	
<p>The venture's raison d'être is to turn a profit and maximize growth.</p>	<p>The venture's raison d'être comes from the sustainability problem it was founded to address.</p>
<ul style="list-style-type: none"> • IP is used to protect innovation from imitation by competitors, thus enabling ventures to profit from it. • As such, IP facilitates economic value capture, which in turn allows ventures to survive and continue creating economic value. 	<ul style="list-style-type: none"> • By enabling venture survival, IP promotes the creation of economic as well as social and environmental value through the venture's value proposition. • Adding considerations of social and environmental value, any economic value captured beyond what is needed for survival is weighed against the needs of society and the environment. Ventures may hence pursue such options as crowdfunding and organic growth to stay focused on social and environmental value creation over economic value capture.

However, with regard to what value was communicated and to what end, ventures placed special emphasis not just on innovativeness and appropriability, but on legitimacy as a sustainable innovator, especially where a sustainable technology or value proposition sought to replace an unsustainable standard. As such, IP was used to present a sustainable innovation as a legitimate counter-argument to the status quo.

As can be seen in Figure 1, the transition from commercial to sustainable motives is additive in this case, meaning that innovativeness and appropriability as indicators of value are supplemented by credible social and/or environmental impact depending on a venture's value proposition. Hence, the commercial assumption that the venture's value lies in its ability to provide a return on investment gets subsumed under the sustainable assumption that the venture's value lies in its ability to create and capture inclusive value. In other words:

P1 Inclusive value. IP is used to prove, signal, and enable credible economic, social, and environmental impact in accordance with the venture's value proposition.

4.2 | Ensuring Freedom to Operate

As a motive in the appropriation literature, freedom to operate is often related to preemptive patenting and other tactics that prevent a firm from being blocked. Many ventures in this study used patenting, as well as lead times, publishing and secrecy as a way to protect their options in relation to incumbents in particular. In a commercial business model, freedom to operate hence guarantees the venture's present and future ability to create and capture economic value, and clearly, this is still important in a sustainable business model. However, IP also prevents blocking of sustainable innovations seeking to replace unsustainable standards. As such, social and/or environmental value is created through an innovation's diffusion in the wider market.

Additionally, ventures occasionally used IP to prevent blocking or misappropriation without expecting any future economic value creation or capture. In these instances, which often occurred where commercial success was hard to realize within a limited amount of time and with limited resources, IP was shared simply to create social and/or environmental value by increasing the amount of knowledge available in the public domain. Hence, in a sustainable business model, ventures seek to protect not only their own freedom to operate but that of (stakeholders within) their value network, in the realization that it is not so much important that *they* themselves create value as that value *is* created.

“Ensuring freedom to operate” therefore shifts focus from the venture and its ability to create and capture value to the value being created and captured. Specifically, it is of greater importance that value *is* created and captured than that the venture is the one to create and capture it. In this context, commercial and sustainable priorities may pull the venture in different directions, to prioritize itself or its value network respectively.

P2 Value network. IP is used to ensure not only that the venture is free to create and capture value, but that value is free to be created and captured by the value network at large.

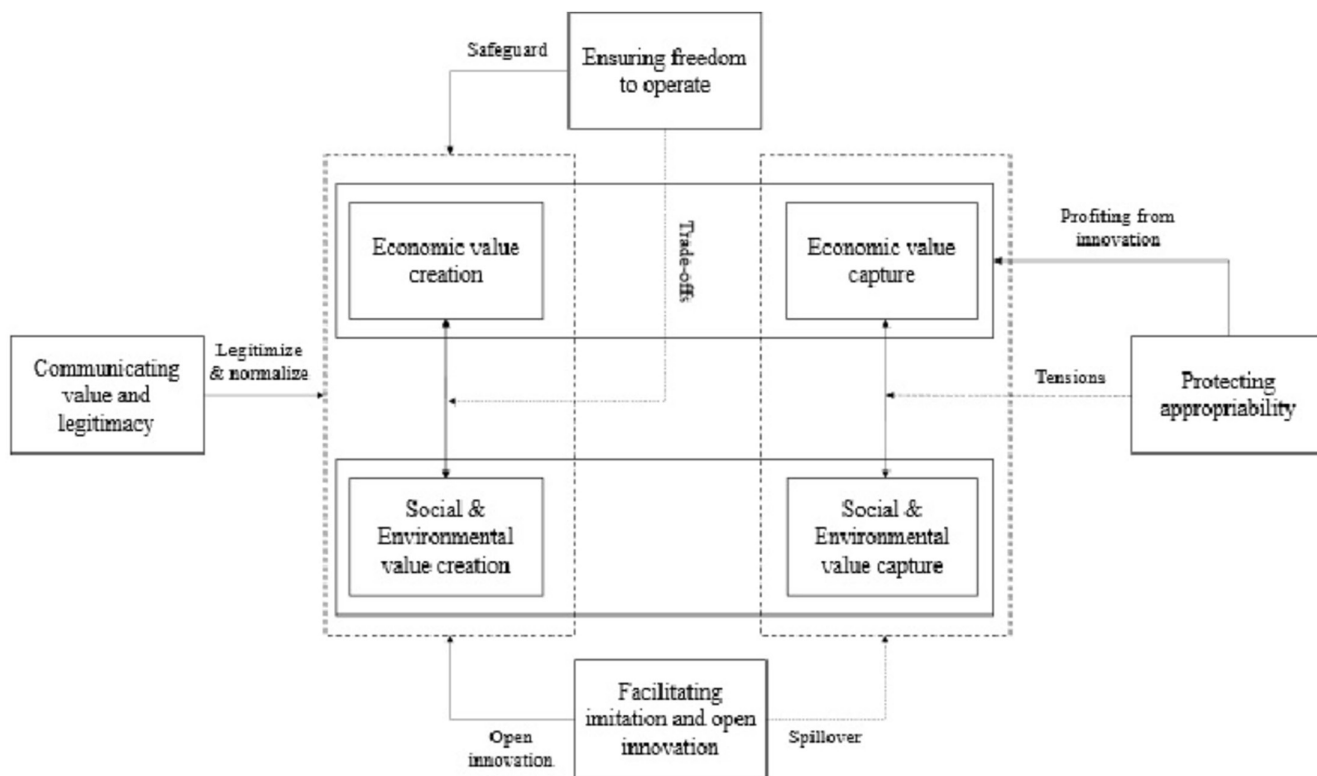


FIGURE 2 | IP in relation to economic, social, and environmental value creation and capture.

4.3 | Facilitating Imitation and Open Innovation

As research on open innovation has extensively explored the role of IP, its importance in the commercial business model has been established. Startups accordingly recounted decisions involving lead times, patenting, publishing, and secrecy that facilitated open innovation for both commercial and sustainable ends. That is, IP allowed ventures to protect their commercial interests while pursuing joint goals related to sustainability, making this motive particularly relevant to the sustainable business model.

Moreover, it was found that certain decisions were taken specifically to disseminate knowledge and encourage imitation. While these decisions helped create future economic value by increasing total market share, they contributed to the diffusion of knowledge first and foremost, benefiting all (kinds of) stakeholders. Equally significant, by creating value with no direct designs on capturing it, ventures disseminated “free” knowledge that could result in value capture by societal and environmental stakeholders depending on the knowledge disseminated. Specifically, knowledge could be used by agentic collectives, e.g., communities, in society first, and even spill over into the environment to be used by intermediaries in ecological restoration.

As can be seen in Figure 1, this motive has progressed the most in the existing literature as research on open innovation, patent pools and pledges have all specifically addressed the issue of sustainable innovation. Consequently, the role of IP is reconceptualized from one focused on the venture and its collaborators to one that enables value creation and capture throughout the value network. This means that IP is used to widely promote

value flows without necessarily controlling them, for instance, by diffusing knowledge that can accelerate innovation but can also simply benefit stakeholders affected by the venture's value chain.

P3 Promoting value flows. IP is used to share knowledge and diffuse concepts, both to enable collaboration and to facilitate value creation and capture by other stakeholders.

4.4 | Protecting Appropriability

Finally, protecting appropriability forms the most classic motive for using IP in the commercial business model. Startups hence used lead times, patenting, secrecy, and trademarks to protect against imitation and ensure they could profit from their innovation. As such, IP was considered necessary for financial survival. Unsurprisingly, this motive related strongly to economic, and only indirectly to social and environmental value creation and capture.

Specifically, while patents may help diffuse innovation, they can similarly hinder. As a result, economic value capture may prevent social and/or environmental value creation by preventing access and use of valuable intangible resources by societal actors and environmental intermediaries. Even so, sustainable business models do rely on startups surviving financially in order to develop sustainable innovations, grow new markets, and deliver on their value propositions. Here, economic value capture forms a prerequisite to social and environmental value creation for any for-profit venture, though the centrality of this motive is tempered by the need to balance economic against social and

environmental value creation and capture. Rather than maximize economic value, growth ambitions were hence conditional on the venture's value proposition. In other words, economic value creation and capture were necessary conditions for social and environmental value to be created and captured but were seldom pursued beyond the threshold of necessity.

As such, "protecting appropriability" shifts the venture's *raison d'être* from making a profit to addressing the sustainability issue it was founded to confront. This does not change the functioning of the motive so much as it changes its threshold, protecting balanced value creation and capture by tempering the profit motive. Defining this threshold, however, comes with the potential for tensions and conflicting priorities.

P4 Balanced value. IP is used to enable appropriability to the extent that appropriability enables venture survival and optimal growth so the venture can deliver on its value proposition.

4.5 | Comparing IP Motives

Comparing motives against existing research based on commercial business models hence revealed commonalities, but also new functions and priorities related specifically to sustainable business models. Table 3 summarizes this comparison.

The need to consider social and environmental value in addition to economic value hence creates new priorities for IP that alter and at times challenge existing practice. Quite often, some potential to create and/or capture economic value needs to be sacrificed in order to create social and environmental value. In some cases, prioritizing social and environmental value creation at the expense of short-term economic value capture enables increased value creation of all forms in the long run. In other cases, economic value simply shrinks as a result of decisions to promote social and environmental value, making this a harder decision to take.

To further explore the relationship between IP and value in its different forms, Figure 2 relates each motive to economic, social, and environmental value creation and capture. In the figure, boxes with untransparent lines group economic value creation and capture, and social and environmental value creation and capture. Meanwhile, different forms of value creation and capture were grouped with dashed lines to show that, while the former often complement each other, this need not be the case for the latter.

Social and environmental value were grouped because they were typically pursued through the same channels. That is, while the pursuit of economic value was a function of the venture's status as a for-profit organization, the pursuit of social and/or environmental value was a function of the venture's value proposition. In other words, ventures formulated their value propositions around a social and/or environmental sustainability issue and sought to develop a(n) (at minimum) profitable business case around solving it. While most ventures focused on addressing environmental concerns first and foremost, solutions often had a social impact by improving transparency, reducing pollution, and/or improving living and labor conditions.

Moreover, though social and environmental value both contain immense diversity and even contradiction not just between, but within realms (i.e., different societal and environmental stakeholders value different, at times competing things), regarding a venture's IP decisions, they present a similar challenge. Specifically, while different IP issues may be relevant in relation to different forms of value, from the venture's perspective they pose the same dilemma, namely, how to facilitate value creation and capture for external, usually collective, potentially nonactor stakeholders. Notably, unlike many other forms of external value creation, e.g., with regard to open innovation, this value will mostly *not* end up benefiting the venture by materializing as increased opportunities for economic value creation and capture. Instead, it involves the pursuit of social and environmental value as autonomous ends.

Hence "communicating value and legitimacy" with its inclusive view of value involves decisions that promote value creation of every kind. Meanwhile "ensuring freedom to operate" includes decisions that safeguard the ability of all (actor and nonactor) stakeholders to create value, which may relate to all types of value but need not do so equally. Therefore, IP decisions may involve trade-offs, for instance, when a venture practices secrecy to safeguard its ability to create economic value from knowledge that could create social and/or environmental value if it were shared freely. On the other hand, when knowledge is published to enable widespread value creation, this can disincentivize corporate actors from developing it.

As decisions taken for the sake of "facilitating imitation and open innovation" promote value flows, they typically also enable all kinds of value creation. Moreover, as IP is used to encourage value creation without necessarily attempting to control it, value can be created that does not have a vested, corporate interest attached to it. As such, value may "spill over" into the social and/or environmental realm to be captured by whomever benefits. For instance, when a venture freely disseminates knowledge about its materials, the value from this knowledge can be captured by society when end consumers gain the ability to repair and/or modify their own garments. In turn, the environment benefits from, for instance, improved product longevity, creating opportunities for renewal of the environmental resources used in production.

Finally, IP decisions taken to "protect appropriability" chiefly enable economic value capture, yet likewise facilitate value creation of all kinds by serving as a means to the end of venture survival. However, in the same way that open innovation may create spillover value, appropriability may prevent it when ventures prioritize profit over social and environmental impact. That is, the threshold of "necessary" economic value capture and "optimal" growth is hard to establish in practice, and tensions may persist between different kinds of value capture.

It should be noted that tensions between economic value creation and social and environmental value capture were omitted in the figure, as have tensions between social and environmental value creation and economic value capture. There is however a very real possibility for economic value creation to inhibit social and environmental value capture, as when textile production pollutes local environments and consequently impacts the

health of people living in the area. Likewise, social and environmental value creation may limit the extent to which economic value can be captured, as when pharmaceutical knowledge is freely shared and therefore unavailable for corporate patenting. For conceptual clarity, tensions of this kind have been subsumed under the trade-offs and tensions between value creation and value capture dimensions, as has the role of IP in managing them.

Finally, as mentioned, social and environmental value were grouped for ease of analysis as these were often complementary in venture's value propositions and presented the same dilemma with regard to IP. However, not all ventures pursued both equally or in the same form, and tensions between social and environmental forms of value are not just possible but, depending on the value proposition, very likely. For instance, though overconsumption in a fast fashion business model appropriates environmental resources, it may create social value in the form of self-expression and recreational shopping. Likewise, contradictions are possible even within social value, as clothing consumption may enable self-expression but harm self-esteem, and these effects are themselves dependent on the stakeholder and what this stakeholder actually values. Relationships are hence simplified to show the role of IP specifically, notwithstanding tensions and contradictions that may result from the idiosyncratic nature of the different kinds of value created and captured.

In conclusion, IP amply supports value creation of all kinds, as well as economic value capture. Value may spill over to allow for social and/or environmental value capture, but there is a lack of structural consideration for either in ventures' IP decisions. In other words, ventures may leave value "uncaptured" to allow societal and environmental stakeholders to capture it, but IP is only sparingly used to actively enable this by, for instance, creating open-source technologies or knowledge commons. One reason for this may be that the relationship between social, environmental, and economic value capture is subject to tensions, meaning that value captured by society or the environment typically reduces the amount of economic value that ventures can capture for themselves. Given their lack of resources in general, many ventures may not be able to afford "passing up" on economic value or structurally funneling time and resources into enabling social or environmental value *capture* in addition to value creation. Another reason, mentioned by a number of ventures in the sample, relates to a lack of options for taking part in open-source or commons-type ownership structures, a lack of knowledge regarding *how* to take part, and a lack of support from (financial) stakeholders in the form of, for instance, VCs, incubators, and corporate collaborators.

Finally, though different kinds of value creation can be complementary, there is a potential for trade-offs, meaning value need not be created equally across dimensions. In other words, while ventures' IP motives reveal a structural consideration for creating value of all kinds, they do not reveal a structural consideration for *balancing* them. In turn, this means that while IP decisions reflect a priority to create and capture a minimum level of economic value, no similar threshold exists for social and/or environmental value. Hence, ventures use their IP to create and capture sufficient economic value to ensure venture survival but facilitate social and environmental value creation

and capture only beyond this threshold. Specifically, social and environmental value creation were typically assumed to be a function of the venture's value proposition, while value capture was not structurally facilitated within either the venture's IP or its business model.

In the following, these results are related back to the literature on IP in sustainable innovation, sustainable entrepreneurship, and sustainable business models. While the role of IP in sustainable innovation forms a nascent theme, the latter two are mostly untapped as research areas. The aim is hence to contribute a theory-building effort, reconceptualizing the role of IP in the sustainable business models of entrepreneurial ventures, including a discussion on its relation to social, environmental, and economic value creation and capture by highlighting caveats and opportunities.

5 | Discussion

This study sought to examine the role of IP as a means of enabling value creation and capture in the sustainable business model of ventures practicing sustainable entrepreneurship in the fashion industry. As an artifact designed to promote economic value creation by enabling economic value capture, it is currently unclear how its use relates to social and environmental value as autonomous ends within the sustainable business model. Specifically, this study sought to address gaps in the literature at the intersection of sustainable business models, appropriation, and IP.

That is, while research on sustainable business models has assumed that where value is created, it will automatically be captured by relevant stakeholders (Lüdeke-Freund et al. 2020), appropriation has focused on economic value to the exclusion of social and environmental value, disregarding asymmetries in the value created and appropriated by different stakeholders (i.e., social, environmental, and economic) (Ritala et al. 2021). Finally, though research has shown that IP is used for a variety of motives in the commercial business model, within corporate sustainability, research has focused almost exclusively on its role in the development and diffusion of innovation (Hernández-Chéa et al. 2020).

By studying IP decisions in relation to the sustainable business models of entrepreneurial ventures, this paper hence aimed to reconceptualize the role of IP in corporate sustainable development beyond incentivizing innovation by enabling economic value capture to examine its relationship to value creation and capture of all kinds.

5.1 | From Innovation to Value

As a first contribution, this study hence examined the role of IP in the sustainable business model of entrepreneurial ventures, comparing findings to the existing literature on IP and appropriation. As mentioned, most research at the intersection of IP and sustainability has studied whether IP hinders or helps the development and diffusion of sustainable innovation (Athreye et al. 2023; Henry and Stiglitz 2010; Jain et al. 2024). Beyond

incentivizing sustainable innovation with a social and/or environmental impact, the role of IP in managing value hence remains unknown. However, the limited scholarship on the role of IP in sustainable development suggests that there is potential for IP to contribute positively if managed well (Chon 2018), or hinder if managed poorly (Athreye et al. 2023; Castaldi 2021). Hence, IP may be used in managing, creating, capturing, and governing not just innovation, but *value* between relevant stakeholders (cf. Upward and Jones 2016).

To examine this possibility, analysis used the motive construct prevalent in the appropriation literature (cf. Blind et al. 2006; Morales et al. 2023; Thomä and Bizer 2013) to compare the use of IP between commercial and sustainable business models. From the motives thus identified, propositions were derived that together reconceptualized IP as a means of promoting and managing inclusive flows of value across a value network (cf. Evans et al. 2017; Stubbs and Cocklin 2008). Table 4 recapitulates these propositions with examples from the study empirics.

By reconceptualizing the role of IP as one related to managing *value* rather than innovation, this study contributes to the growing research on the role of IP in sustainable innovation and to the limited research on its role in the sustainable business model. It is argued here that there is a need to go beyond the current focus on sustainable innovation to relate IP more broadly to the sustainable business model as the medium through which the value from sustainable innovation is actually realized (Hernández-Chea et al. 2020; Lüdeke-Freund 2020). Moreover, as the contributions of firm-level innovation to sustainable development are limited, and in some cases even questionable (Hummels and Argyrou 2021; Isil and Hernke 2017; Upward and Jones 2016), there is a need to consider firm-level contributions to system-level interventions (Evans et al. 2017). In showing how IP relates to managing value over innovation, this study aims to contribute to such efforts by opening a conversation on the role of IP in enabling the creation and capture of different forms of value in a venture's value network.

In this context, research has pointed to the importance of governance in managing the variegated flows of value involved in a firm's value network (Freudenreich et al. 2020; Lüdeke-Freund et al. 2020; Upward and Jones 2016). Specifically, where value is created and captured by and for a network consisting of stakeholders who each conceive of value in idiosyncratic, complementary, and competing ways, value needs to be managed at the system-level to enable balanced outcomes across different realms. In other words, to overcome institutionalized value asymmetries, value creation, and value capture need to be system-level priorities rather than firm-level responsibilities (Hahn et al. 2018; Ritala et al. 2021; Upward & Jones, 2016).

Notably, IP in its various formal and informal instantiations has been used as a governance mechanism in open innovation between corporate actors, including those contexts where value creation and capture involve complement and substitute relationships between actors and artifacts (Holgersson et al. 2018; Zobel and Hagedoorn 2020). As such, this study suggests that IP can be used to promote, coordinate, and balance value flows (Chon 2018), if only by restricting and redistributing economic value to create opportunities for the creation and capture of

TABLE 4 | The role of IP in the sustainable business model.

<p>Communicating value and legitimacy <i>What value?</i></p> <p>Value in an inclusive sense, not just in terms of appropriability or marketability, but credible social and environmental impact</p> <p>P1. Inclusive value: IP is used to prove, signal, and enable credible economic, social, and environmental impacts in accordance with the venture's value proposition.</p> <p>A venture using an ingredient-branding strategy uses trademarks so its ingredient can be traced across products, providing an IP-based indication of (environmental) sustainability.</p> <p>Facilitating imitation and open innovation <i>How open?</i></p> <p>Open in an unbounded sense, governing but not controlling value flows</p> <p>P3. Promoting value flows: IP is used to share knowledge and diffuse concepts, both to enable collaboration and to facilitate value creation and capture by other stakeholders.</p> <p>Patenting broadly but openly to inspire and suggest alternative uses of a technology without preventing creative imitation or derivative innovation</p>	<p>Ensuring freedom to operate <i>Whose freedom?</i></p> <p>Freedom to create and capture value in a broad sense, for all stakeholders involved, not just the venture</p> <p>P2. Value network: IP is used to ensure not only that the venture is free to create and capture value but that value is free to be created and captured by the value network at large.</p> <p>Publishing knowledge to prevent other corporate actors from patenting, ensuring that this knowledge remains available not only to the venture but also to all its various stakeholders.</p> <p>Protecting appropriability <i>To what end?</i></p> <p>Appropriability in a pragmatic sense, as a means to an end and not as an end in itself</p> <p>P4. Balanced value: IP is used to enable appropriability to the extent that appropriability enables venture survival and optimal growth so the venture can deliver on its value proposition</p> <p>Opting for crowdfunding over venture capital to enable slow growth, focusing on balanced value creation without being hindered by the need to (quickly) capture economic value.</p>

other types. That is, sustainable development may not always require economic growth as suggested by the Brundtland report, but rather redistribution, which frees up resources for societal development and ecological restoration (Hummels and Argyrou 2021).

5.2 | Asymmetries in Value Creation and Capture

Hence, this study additionally contributes to research at the intersection of appropriation and sustainable business models, specifically with regard to differences in appropriability between different stakeholders (Lüdeke-Freund et al. 2020; Ritala et al. 2021). Notably, analysis highlighted that, though ventures used their IP to enable value creation and capture of all kinds, there was potential for tensions and trade-offs. Specifically, while IP was used to secure a minimum level of economic value to ensure venture survival, no similar threshold of social and/or environmental value was structurally defined or pursued. Instead, ventures echoed an assumption that a sustainable venture doing “business as usual” will create sufficient social and environmental value (Matzembacher et al. 2020), and that IP contributes by enabling venture survival.

This does not mean that value was not created or captured. Combined, IP motives reflected a keen concern for social and environmental value creation, but also a need to ensure financial survival as a for-profit business before anything else. As such, ventures faced an economic imperative with a social and environmental incentive. What is meant by this is that economic value needed to be created and captured up to a certain threshold for the venture to survive, while social and environmental value creation and capture both formed important, but essentially optional priorities (cf. Hahn et al. 2018).

As noted, however, many ventures did harbor ambitions to share or redistribute value but could not find the structures or support needed to enable this. Even where economic actors intend to balance value, the need to survive financially may crowd out opportunities to create value for other stakeholders or facilitate its capture. Some ventures therefore could not identify or partake in knowledge commons without losing their competitive advantage and foregoing survival. Others could not get the needed support or approval from their investors, mentors, or collaborators to, for instance, engage in slow growth, all of which pushed them towards IP decisions that aimed at satisfying the economic imperative first and foremost.

What this highlights is that no individual actor can overcome asymmetries by itself (cf. Ritala et al. 2021), especially low-powered ones like startups (cf. Lüdeke-Freund et al. 2020). As appropriation is interdependent (Holgersson et al. 2018), while many types of value are created from the same resource (Yang et al. 2017), any venture deciding to forego economic value disadvantages itself with regard to its competition. Partaking in a commons might cause the venture to lose its competitive advantage, and hence its means of survival, while prioritizing social and/or environmental value creation may cause it to lose its funding, or struggle to secure collaborations. Hence, balanced value can only be achieved through system-level commitments to make social and environmental value a shared

priority (Anand et al. 2021; Isil and Hernke 2017; Rosário et al. 2022).

Based on this discussion, this paper concludes by suggesting two ways in which IP can facilitate this. One, IP can be used by corporate actors to weaken their own appropriability, i.e., their ability to capture value (Hurmelinna-Laukkanen and Yang 2022), in order to leave value “uncaptured” for societal and environmental stakeholders with inferior appropriability (cf. Yang et al. 2017). In essence, this is what legislation does when it prohibits, for instance, economic actors from polluting natural ecosystems. This limits economic value capture by raising the cost of waste disposal but enables environmental value creation and capture by nonactor ecological stakeholders who otherwise would have been powerless to compete for the opportunity to use the resources from this ecosystem.

Two, IP can be used to improve the appropriability of societal and environmental stakeholders, thus leveling the playing field for value creation and capture opportunities—whether these are complementary or substitutive between different stakeholders. While the former highlights opportunities for the practice of IP, the second relates to its design. The following section discusses these opportunities, deriving implications for policy and practice, and contributions to the literatures on appropriation and IP, which have overlooked social and environmental value in lieu of economic value and innovation respectively.

5.3 | Opportunities for IP: Leveling Appropriability

A first opportunity for the practice of IP hence stems from a lack of means and structures that enable social and environmental value as autonomous ends within the sustainable business model (Hahn et al. 2018). This suggests opportunities for improving the conditions under which corporate sustainability in general, and sustainable entrepreneurship in particular, is practiced. That is, where ventures face an economic imperative versus a social and environmental incentive, they are forced to attend to one form of value as a hygiene factor before and above others.

One way in which ventures can attempt to subvert the economic imperative is by seeking sustainability-oriented sources of funding, such as crowdfunding, which enable slow growth with limited pressure to provide a quick or large return on investment (Davies and Chambers 2018; Laasch 2018). Acting on its own, however, a venture's options are limited. At the system level, structures that allow for creating and managing IP collectively can enable knowledge sharing for the sake of social and environmental value creation by (agentic) stakeholders of all types, without sacrificing ventures' ability to capture economic value in the process (Eppinger et al. 2021; Henry and Stiglitz 2010; Vimalnath et al. 2022).

For incumbents, patent pools and pledges are a common way of organizing this (Contreras et al. 2020; Ehrnsperger and Tietze 2019), yet these options are not always accessible to startups due to a lack of resources or competence with regard to IP (Holgersson 2013). Moreover, unless high-quality IP is contributed to the commons and access conditions are non-prohibitive,

collective structures may be ineffective at disseminating IP for the right stakeholders (Athreye et al. 2023; Bustamante et al. 2023; De Rassenfosse and Palangkaraya 2023; Gambardella 2023). Worse, where appropriation asymmetries are not addressed in the design of the collective, collective structures may end up reproducing existing power imbalances (Meyer and Naicker 2023; Rahmatian 2009). For collective organizing to be effective, there is hence a need for shared commitments to enable social and environmental value as autonomous ends. In other words, the social and environmental incentive can only be elevated to an imperative at the level of the system, meaning that collaborators and competitors both are aligned with regard to the system's priorities, including the need to curb economic appropriation to leave value uncaptured for society and the environment (cf. Bocken and Short 2016; Hummels and Argyrou 2021; Isil and Hernke 2017).

The literature on sustainable business models, by focusing on value creation over value capture, has tended to focus on complementarities in the value network rather than substitutes (Lüdeke-Freund et al. 2020; Ritala et al. 2021). However, substitution of value and competition for value creation and capture opportunities form integral dynamics of innovation (eco)systems (Granstrand and Holgersson 2020; Holgersson et al. 2018; Yang et al. 2017). Hence, it is argued here that improving opportunities for society and the environment to create and capture value requires, first and foremost, that economic actors take steps to systematically limit their own appropriability. Collective IP is a good way of enabling this, and yet the previous discussion highlights caveats in terms of the design, or rather governance, of many current initiatives that therefore fail to align on the basis of intent rather than interest.

In this context, research suggests the need for trust-based, relational governance to facilitate intensive, systemic innovation along porous boundaries (Zobel and Hagedoorn 2020). At the same time, formal, contractual governance is especially important in asymmetric relationships as a way to protect against opportunism and build trust in new collaborations (Blomqvist et al. 2005; Holgersson et al. 2018). Hence, it is argued that IP should be treated as a governance mechanism, adapted to the requirements of the value network and designed to manage the flow of different forms of value between stakeholders, including society and the environment (Chon 2018; Evans et al. 2017; Laasch 2018; Stubbs and Cocklin 2008). This means that its design needs to facilitate value creation and capture both for individual stakeholders *within* the value network and for the system as a whole.

As the literature on IP has focused on *innovation* over *value*, there is an opportunity for future research to examine how IP can be designed and managed by and for stakeholders in a value network to enable value creation and capture of different kinds. While this study sought to provide a first answer to this in the context of sustainable entrepreneurship, there is a need to go beyond the level of the focal firm to study systemic, multi-level governance through IP. Hence, as a final suggestion, this study notes the potential, though currently underdeveloped and underutilized, of awarding IPRs to societal and environmental stakeholders in order to improve their appropriability vis-à-vis economic actors (Argyrou and Hummels 2019; Meyer and

Naicker 2023). Awarding the social and environmental realm ownership rights, and therefore means of access and control, within the same (legal) system as economic actors would reduce asymmetries by increasing options for formal rather than (only) informal governance. This, it is argued, would facilitate building the trust that enables systemic value creation and capture by and for different stakeholders.

For practice, these findings suggest a need to systematically organize and prioritize sustainability. Though sustainability has become an important driving force for innovation in the fashion industry in particular (Todeschini et al. 2017), much is still left to private priorities, which can converge around economic interests over societal and environmental concerns. As such, shared commitments need to be enforced through formal and informal governance, which, this study suggests, IP could play a role in. For policy, this study suggests a need to improve the options for different stakeholders to create, share, and practice IP. Specifically, this study highlights a lack in terms of collective IP for corporate actors, but also societal and environmental collectives and intermediaries. If sustainability requires equal social, environmental, and economic value to be created and captured, then equal rights and opportunities to create and capture this value should be awarded. While IP in its current form is evolving to support this, there are caveats where the practice of the system runs up against shortcomings in its design.

6 | Conclusion

The role of IP in sustainable innovation is now an important topic within innovation management. In contrast, its role in the sustainable business model has received scant scholarly attention. As such, the relationship between IP and sustainable development is understood as one where IP relates to social and environmental outcomes only by enabling economic development through innovation. This study sought to examine the role of IP in not just unilaterally promoting or hindering sustainable innovation, but in managing its use in the sustainable business model of ventures practicing sustainable entrepreneurship.

Specifically, this study highlights how IP can enable not only economic but social and environmental value creation and capture. In doing so, it also notes caveats where the practice and design of IP fall short of their potential. As such, the aim was to provide a reconceptualization of IP as a governance mechanism in the creation and capture of balanced economic, social, and environmental value. On the whole, it is suggested that where economic value is an imperative while social and environmental value are an incentive, the potential for asymmetries persists. As such, this study advocates practice and policy interventions to level the appropriability of different (non)actors in the value network. Finally, it encourages future research to develop the potential of IP as a governance mechanism, managing flows of value between different stakeholders.

This study acknowledges limitations in terms of its method and results, specifically the focus on a single industry. As such, some findings may be more relevant to the fashion industry in particular. Additionally, the study's small sample size means

that validation is needed both within the same industry and across industries. Future research could see whether sustainability implies different priorities for different industries in terms of IP. Moreover, with a larger sample size, research within the fashion industry could compare across innovations and business models to see whether IP is more adaptive to the requirements of sustainability in some contexts as opposed to others.

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