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Different settings, different terms and conditions: The impact of intellectual property arrangements on co-creation project performance

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[Correction added on 20 April 2023, after first online publication: The copyright line was changed.]

Abstract

Innovation-focused co-creation between companies and individual external contributors is accompanied by the challenge of managing intellectual property (IP). The existing literature presents scattered evidence of various elements of the arrangements adopted by companies to manage their IP (such as a high or low degree of IP control, monetary or non-monetary compensation, non-disclosure agreements, additional agreements, and the waiver option) in different co-creation settings (including crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops). However, the existing literature exhibits little understanding of how particular IP arrangements influence co-creation project performance in specific settings. Drawing upon contingency theory and configurational theory, we provide a framework that explains both the effectiveness of different IP configurations and the moderating role that co-creation settings may have on the relationship between IP arrangements and project performance. By the means of fuzzy-set Qualitative Comparative Analysis (fsQCA) on a sample of 116 co-creation projects, we determine the impact of various IP arrangements on project performance in different co-creation settings, and we show how this effect differs across those settings. Our study also demonstrates that IP matters for success in co-creation, while highlighting the interdependence of multiple elements of IP arrangements and their joint influence on co-creation project performance. Our study thus fills the gap in the literature where previous research failed to embrace the context-dependent and multidimensional effect of IP arrangements on co-creation project performance. Additionally, this study offers best-practice guidelines for managers for designing IP arrangements to meet the specific characteristics of their co-creation projects and to ensure their success.

KEYWORDS

co-creation, fuzzy-set QCA, intellectual property management

1 | INTRODUCTION

Companies frequently rely on co-creation with *individual external contributors*—such as customers, users, innovation enthusiasts, hobbyists, or independent experts—to improve existing products and services or develop completely new solutions (Gemser & Perks, 2015; Piller & West, 2014; West & Bogers, 2014). They apply a variety of co-creation settings, from crowdsourcing contests, through virtual communities, to single expert sessions and lead user workshops, to reach out to and interact with potential contributors with the goal of coming up with new ideas, concepts, and prototypes that may add value to companies' innovation projects (Prahalad & Ramaswamy, 2004). Together they may produce innovative assets that may accrue intellectual property (IP) rights, that is, patents, trade secrets, copyright, design rights, or trademarks. The ownership rights of these co-created assets may be contentious, as they may be built on knowledge and creative inputs contributed from both sides—the company and external contributors (Hienerth et al., 2011; Lauritzen & Karafyllia, 2018; Tekic & Willoughby, 2020). Thus, co-creation is inevitably accompanied by complex challenges related to IP management (Antorini & Muñiz Jr., 2013; Boudreau & Lakhani, 2013; Greer & Lei, 2012; Hienerth et al., 2011).

Innovation management research offers scattered evidence of heterogeneity of IP arrangements in crowdsourcing contests (de Beer et al., 2017; Franke et al., 2013; Mazzola et al., 2018; Tekic & Willoughby, 2020), virtual communities (Harwood & Garry, 2014; Parmentier & Mangematin, 2014; Tekic & Willoughby, 2020), single expert sessions (Chatterji & Fabrizio, 2014), and lead user workshops (Lilien et al., 2002). However, there is little understanding how different IP arrangements drive project success in different co-creation settings such as the ones mentioned above.

The purpose of this study is to fill this gap by addressing the following research question: *What is the impact of different IP arrangements on project performance within and across various co-creation settings?* Drawing upon contingency theory and configurational theory, we provide a framework that explains the impact of IP arrangements on co-creation project performance, as well as the moderating role that co-creation settings may have on the relationship between IP arrangements and project performance.

Our empirical study is based on a sample of 116 co-creation projects run by an open innovation intermediary consultancy (referred to hereafter as *OIconsult*) in the timeframe between 2006 and 2018 for 74 different client companies, such as BMW, Audi, Adidas, Beiersdorf, Danone, Deutsche Telekom, Fujitsu, Volkswagen, Henkel, Siemens, Unilever, and so on, operating in a diversity of industries. We conduct fuzzy-set Qualitative Comparative Analysis (fsQCA) to identify specific IP arrangements, operationalized as distinctive configurations of various IP-management elements (i.e., high or low degree of IP control; monetary or non-monetary compensation; employment of non-disclosure agreements; employment of additional agreements; and employment of the waiver option), which lead to high or low co-creation project performance, operationalized in terms of outcome quality, stakeholder satisfaction, as well as time and budget performance. By analyzing the effect of different IP arrangements on co-creation performance in a variety of co-creation settings—namely, (1) crowdsourcing contests, (2) virtual communities, (3), single expert sessions, and (4) lead user workshops—we demonstrate that this effect differs across co-creation settings. Our results show that: in crowdsourcing contests effective IP arrangements are based on employment of additional agreements and monetary compensation; in virtual communities on a low degree of IP control, monetary compensation and employment of NDAs; in single expert sessions on a high degree of IP control, monetary compensation and employments of NDAs; while in lead user workshops on either a low degree of IP control and employment of additional agreements and NDAs, or on a high degree of IP control, complemented by monetary compensation and the employment of NDAs.

Practitioner points

- Managers should apply configurational and contextual considerations when designing IP arrangements for co-creation projects.
- An effective IP arrangement is the one that embodies a configuration of multiple elements that are aligned both internally and externally to the given co-creation setting.
- IP-arrangement elements, such as IP control, compensation, NDAs, additional agreements, and the waiver option, are interdependent and jointly influence co-creation project performance.
- The effect of IP arrangements on co-creation project performance is context-dependent; thus, managers need to adjust co-creation terms and conditions to different projects they are running, that is, crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops.

In this way, our study provides an advanced understanding of specific configurations of IP arrangements that ensure the success of co-creation in distinctive settings and, thereby, makes three primary contributions to embryonic research on IP management in co-creation, and open innovation in general.

First, our empirical study confirms that *IP matters for the success of co-creation within and across a variety of settings*. It may be responsible for high or low co-creation project performance in crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops. Most previous research discussed IP arrangements that companies typically adopt in co-creation, but without looking into their impact on co-creation performance (e.g., Chatterji & Fabrizio, 2014; de Beer et al., 2017; Lilien et al., 2002; Parmentier & Mangematin, 2014; Tekic & Willoughby, 2020).

Second, building on the idea of the configurational character of IP arrangements (Tekic & Willoughby, 2020), we show that rather than the influence on its own of a single element of an IP arrangement on co-creation performance, it is the combination of IP elements which matters. By highlighting the relevance of the *interdependence of multiple IP-arrangement elements and their joint influence on co-creation project performance*, our study adds to previous research that focused mainly on the influence of a single element of IP arrangements, for example, the degree of IP control determined by companies in co-creation (Mazzola et al., 2018) or the waiver option (Franke et al., 2013). By leaving other elements beyond the scope of their analysis (i.e., compensation, additional agreements and NDAs), previous research was unable to embrace the multidimensional character of the influence of IP arrangements on co-creation project performance.

Third, taking into account multiple co-creation settings, our study offers a holistic perspective on IP management in co-creation by emphasizing the *context-dependent character of its influence on co-creation performance*. Previous research that aimed at determining effective IP arrangements focused specifically on crowdsourcing contests (Franke et al., 2013; Mazzola et al., 2018), while leaving other settings outside the scope of research. Our study not only deepens the insights of previous research addressing the influence of IP arrangements on performance in crowdsourcing contests, but also provides novel evidence of their influence on performance in other co-creation settings, namely virtual communities, single expert sessions, and lead user workshops. By identifying the variety that may be observed in effective IP arrangements across the four co-creation settings analyzed in our study, we concur with the proposition that there is no "one-size-fits-all" formula for IP management in open and collaborative innovation (Alexy et al., 2009; Felin & Zenger, 2014; Tekic & Willoughby, 2020), and additionally suggest that context matters.

Finally, practitioners struggling with IP management in co-creation may benefit from actionable insights provided by this study. We suggest applying configurational and contextual considerations when designing IP arrangements for co-creation projects. Our results offer

TABLE 1 Elements of IP arrangements in co-creation.

Elements	Description	Key articles
IP control	The element that defines the degree of IP control attained by the company, i.e., high (e.g., transfer of ownership or exclusive license) or low (e.g., non-exclusive license).	de Beer et al. (2017); Mazzola et al. (2018);Tekic and Willoughby (2020)
Compensation	The element that defines the nature of compensation for contributors' effort and IP, i.e., monetary and/or non-monetary rewards.	Franke et al. (2013); de Beer et al. (2017); Tekic and Willoughby (2020)
NDA	The element used by companies as a mechanism to protect their know-how and any confidential information related to co-creation projects.	Lauritzen (2017); Foege et al. (2019); Tekic and Willoughby (2020)
Additional agreement	The element that contains supplementary conditions that are typically not specified within the project's general terms and conditions.	Tekic and Willoughby (2020)
Waiver option	The element that indicates the temporary transfer of IP from contributors to companies during a specified time period.	Franke et al. (2013); Tekic and Willoughby (2020)

unique best-practice guidelines for managers about how they may combine different elements of their IP arrangements to align them both internally and externally to a given co-creation setting and maximize performance of their projects. Employing IP arrangements that are based on inappropriate combinations of IP control, compensation, NDAs, additional agreements and the waiver option, or inappropriate inclusion or exclusion of one or more elements, may lead to low co-creation project performance, in the form of poor outcome quality, stakeholder dissatisfaction, and/or failure to comply with time and budget constraints.

The remainder of the article proceeds as follows. After presenting the research gap which this study seeks to fill, we present our framework integrating configurational and contingency perspectives on the influence of IP management on co-creation performance. We further provide an overview of our empirical study, the data collection, and the fsQCA analytical procedure. Following presentation of the results, we discuss how specific elements of IP arrangements influence project performance in different co-creation settings. The article concludes with the study's implications for research and practice, as well as its limitations and propositions for future empirical inquiries.

2 | LITERATURE REVIEW

Prahalad and Ramaswamy (2004) defined co-creation as the process during which customers take an active role in defining and creating value together with companies. Even though co-creation may occur along the entire value chain, most often it refers to collaborative development activities, such as joint generation of new ideas, concepts, and prototypes for new or improved products or services, where customers are seen as a non-traditional, but valuable source of innovation. Inspired by the potential of co-creation, over time companies have expanded the focus of their co-creation activities to include a diverse array of individuals from outside their organizational boundaries—not just customers, but also amateur innovation enthusiasts, hobbyists, or independent experts or, in fact, anyone who has the requisite experience, skills, knowledge, or expertise to bring value to companies' innovation projects (Piller & West, 2014; Tekic & Willoughby, 2019; West & Bogers, 2014).

2.1 | Co-creation and IP management

To ensure proper and transparent management of IP in co-creation, companies enclose IP arrangements in their projects' terms and conditions, which are typically part of a publicly announced (or, on rare occasions, private) "call for participation," also known in the crowdsourcing literature as a "request for proposals" or an "RFP" (Lüttgens et al., 2014; Mazzola et al., 2018). Previous research offers evidence of different elements of which IP arrangements are composed (Table 1). These IP arrangements define how companies protect co-creation outcomes and how they arrange ownership and user-rights of those outcomes. They differ in their degree of IP control (e.g., de Beer et al., 2017; Mazzola et al., 2018), compensation structure (e.g., de Beer et al., 2017; Franke et al., 2013), non-disclosure agreements (NDAs) (e.g., Foege et al., 2019; Lauritzen, 2017), additional agreements (e.g., Tekic & Willoughby, 2020), and the waiver option (e.g., Franke et al., 2013; Tekic & Willoughby, 2020).

The *IP control* imposed by the initiating companies is determined by the ownership and licensing agreements that comprise the critical core of the terms and conditions of co-creation projects. IP control is considered to be the "trickiest" issue of IP management in co-creation (de Beer et al., 2017; Hoyer et al., 2010), as a high degree of IP control is considered necessary to ensure value appropriation, but may inhibit value creation, whereas a low degree of IP control may foster value creation, but may nevertheless lead to potential problems with value appropriation (Dahlander & Gann, 2010; Henkel et al., 2014). Accordingly, by obtaining IP ownership companies gain residual control rights to the co-creation outcomes (Mazzola et al., 2018) and thereby ensure the highest degree of IP control; and the transfer of ownership of results to companies leaves individual external contributors with no IP rights, thereby assuring for companies value appropriation and freedom of use (Berthon et al., 2015; Bonabeau, 2009; Chatterji & Fabrizio, 2014; Parmentier & Mangematin, 2014). At the same time, companies sometimes choose to avoid obtaining ownership of co-creation outcomes by instead acquiring rights to use those outcomes through licensing agreements. Companies may obtain exclusive licenses to co-created solutions, or instead opt for a lower degree of IP control, by employing non-exclusive, or Open Source or Creative Commons licenses (de Beer et al., 2017; Mazzola et al., 2018; Tekic & Willoughby, 2020).

As *compensation* for co-creators' efforts and/or their IP, companies employ various monetary and non-monetary rewards (Bonabeau, 2009; Felin & Zenger, 2014; Feller et al., 2009; Tekic & Willoughby, 2020). Monetary rewards are generally preferred by both companies and co-creators. While being associated with higher motivation by co-creators to engage in co-creation (Alexy & Leitner, 2011; Franke et al., 2013; Lauritzen & Karafyllia, 2018), monetary rewards also allow companies to "pay" the co-creators for their contribution and thereby avoid potential moral

and legal issues related to the use of an unpaid labor force (Felin & Zenger, 2014; Schaarschmidt & Kilian, 2014; Terwiesch & Xu, 2008).

Another important element of IP arrangements in co-creation is agreeing on confidentiality (Foege et al., 2019; Lauritzen, 2017; Tekic & Willoughby, 2020). *Non-disclosure agreements* (*NDAs*) are used by companies as a mechanism to protect their know-how and any confidential information related to co-creation projects, and thus as a means for managing the risks of involving individual external contributors in corporate innovation projects (Enkel et al., 2005). NDAs reduce opportunistic behavior and create a trusted co-creation environment (Foege et al., 2019; Lauritzen, 2017), as they assure that both the company and the co-creator(s) retain the legal rights over their respective IP, while preventing disclosure of the shared knowledge or trade secrets to third parties (Bogers, 2011).

IP arrangements may also include notice of *additional agreements* in to which the companies may enter with valuable contributors, specifying the conditions that would apply should the co-creation outcomes be realized and commercially used (Tekic & Willoughby, 2020). These supplementary conditions are typically not revealed within the project's original general terms and conditions but are left to be determined later in the process.

Finally, companies sometimes include a *waiver option* within the terms and conditions of their co-creation projects, whereby they agree to return the rights they obtain through transfer of ownership or different licensing agreements back to co-creators, within a specific period of time if they decide not to use the co-creation outcomes (Tekic & Willoughby, 2020), or even after a limited period during which co-created products are sold (Franke et al., 2013). By embracing the idea of a temporary transfer of IP rights to the initiating company, the waiver option represents a potentially promising element of IP arrangements that are more accommodating of the needs and desires of co-creators, reducing their feeling of loss and unfairness (Franke et al., 2013; Tekic & Willoughby, 2020).

2.2 | IP management across a variety of co-creation settings

Companies do not exhibit a uniform approach when reaching out to, or interacting with, individual external contributors, but rather operate in a variety of co-creation settings (Figure 1), such as crowdsourcing contests (Jeppesen & Lakhani, 2010; Terwiesch & Xu, 2008), virtual communities (Hienerth et al., 2014; Jeppesen & Frederiksen, 2006), single expert sessions (Chatterji & Fabrizio, 2014), or lead user workshops (Herstatt & von Hippel, 1992; Lilien et al., 2002). These settings vary in the *nature of the co-creation medium* (e.g., Füller & Matzler, 2007; Leminen & Westerlund, 2019; Piller & West, 2014; Schmidt & Brinks, 2017)—that is, online (co-creation takes place in a virtual environment) or offline (co-creation takes place in a face-to-face environment)—and in the *morphology of co-creation engagement* (e.g., Afuah & Tucci, 2012; Jeppesen & Lakhani, 2010; Marchi et al., 2011; Tekic & Willoughby, 2019)—that is, company-to-one (each contribution comes from a single co-creator) or company-to-many (each contribution is a result of a collective effort). As such, different co-creation settings may call for different IP arrangements, as evidenced by the heterogeneity of IP arrangements that companies typically adopt in crowdsourcing contests, virtual communities, single expert sessions and lead user workshops.

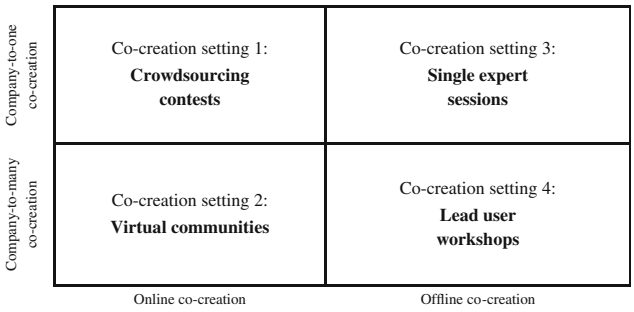

FIGURE 1 Four distinctive co-creation settings.

Previous research highlights the tendency of companies hosting crowdsourcing contests to obtain a high degree of IP control, through IP ownership or exclusive rights to the most valuable contributions, while offering monetary compensation in return (de Beer et al., 2017; Mazzola et al., 2018; Tekic & Willoughby, 2020). Conversely, in virtual communities companies tend to employ a low degree of IP control, through non-exclusive or open source licensing arrangements to avoid the negative effect that a high degree of IP control may have on collective creativity (Harwood & Garry, 2014; Parmentier & Mangematin, 2014; Tekic & Willoughby, 2020). Finally, in lead user workshops and single expert sessions, companies typically compensate individual external contributors for their participation and IP in the outcomes of co-creation (Chatterji & Fabrizio, 2014; Lilien et al., 2002).

Given that these insights arise primarily from research focused on a single co-creation setting, we conducted an exploratory interview with an experienced

TABLE 2 Key insights from the exploratory interview.

Key insights	Illustrative quotes from the interview
Importance of IP in co-creation	"One of the first questions that our client companies ask is how they can actually retain the IP that they generate. In open innovation there is already a lot that they disclose, and they are afraid of disclosing information, so they want to gain the IP that they can after they disclose some of their own knowledge." "For our clients IP is a very important topic, so we always have a lot of discussion with them about how to best retain most of the IP. [...] If it would be only up to them, they would protect as much as they could, but to get the most of it [co-creation], you need to be a little more open."
Interdependency of IP elements	"It really depends on the project. For participants in crowdsourcing it is mostly about how they get compensated for their ideas and that is more important for them, I would say, than retaining IP for themselves. For workshops it may be different, when participants may be interested in using the knowledge that is generated in the workshop, so for them the sharing part is probably more relevant." "In workshops you often pay people to participate so they have some kind of compensation, and in these cases it is easier to have stricter rules on IP and you can attain more IP, without disappointing the people participating or scaring them away from participating."
Dependency of IP arrangements on co-creation settings	"They [IP arrangements] are different because in different settings we have different possibilities and the rules need to be kind of different." "NDAs are more common in lead user workshops. We have done a crowdsourcing project using NDAs, but that really limits what you can do. In crowdsourcing is all about having as many as possible people to participate, so NDAs are really a burden that you would ideally like to avoid. When you have 8–12 people in a workshop it is easier to have everyone sign an NDA, compared with having 200 people in a crowdsourcing contest." "In online setting there is more anonymity and less trust, I would say, so everything that is public people expect it to be shared. I think this is also why some clients would like to have NDAs in online also, but I do not know it can really protect you, but in offline setting it is easier to protect your IP. In online it is close to impossible, if you have a lot of people and do not know something leaves the platform. Also, when everything is public, the question is what is even protectable." "In crowdsourcing contests everything is very open and you have many participants, but there are only few winners who receive the prize. So, with regards to fairness, only the winners are the ones who actually hand over the IP. But this may be very different, for example, in lead user workshops, where it is a closed setting with limited number of co-creators. You know all the people that participate, and you know who gets access to all of the information. So, the setting is different, and with different settings you have different rules for IP."

co-creation project manager from *OIconsult*, to obtain a better understanding of how IP is managed across different co-creation settings, how the IP arrangements are configured, and why they are designed differently in different settings.

Key insights from our interview include the importance of IP in co-creation, the interdependency of different elements of IP arrangements, and the dependency of the IP arrangements on co-creation settings (see Table 2 for excerpts). Concurring with our insights garnered from the literature, our insights from practice emphasize the interdependency between IP control and compensation, as compensation makes it "*easier to have stricter rules on IP and you can attain more IP, without disappointing the people participating or scaring them away from participating*." Our interviewee also highlighted that IP arrangements "*are different because in different settings we have different possibilities and the rules need to be kind of different*." Heterogeneity of IP arrangements across co-creation settings evidenced from the literature may be influenced by differences in the nature of the co-creation media. Thus, "*in online setting there is more anonymity and less trust, [...] but in offline setting it is easier to protect your IP. In online it is close to impossible, if you have a lot of people and don't know something leaves the platform. Also, when everything is public, the question is what is even protectable*." Another prominent theme in our interview with the *OIconsult* co-creation manager was that some elements of IP arrangements may not be a good fit for all co-creation settings. For example, in the words of the manager, "*NDAs are more common in lead user workshops. We have done a crowdsourcing project using NDAs,*

TABLE 3 Overview of key research on IP arrangements in co-creation.

Article	Research question	Type of research	Method and sample	Co-creation settings	IP arrangements (independent variables)	Construct of investigation (dependent variable)	Relevant insights
Our study	What is the impact of IP arrangements on project performance within and across various co-creation settings?	Quantitative	Fuzzy-set Qualitative Comparative Analysis: $N = 116$ projects	4 settings: • Crowdsourcing contests • Virtual communities • Single expert sessions • Lead user workshops	5 elements: • IP control • Compensation • NDA • Additional agreement • Waiver option	Project performance, in terms of outcome quality, stakeholder satisfaction, time, and budget performance	IP elements are interdependent and jointly influence project performance. Influence of IP arrangements on project performance is context-dependent.
de Beer et al. (2017)	Why and how should organizations deal with IP when engaging in crowdsourcing?	Conceptual	Conceptual overview: $N = 4$ projects	1 setting: • Crowdsourcing contests	2 elements: • IP control • Limiting liabilities	No quantitative model	Overview of 4 IP management approaches in crowdsourcing.
Franke et al. (2013)	What are the antecedents and consequences of contributors' fairness expectations in crowdsourcing?	Quantitative	2 experimental simulations: $N = 711 + 182$ respondents	1 setting: • Crowdsourcing contests	1 element: • Waiver option Control variable: • Compensation	Distributive fairness expectations in crowdsourcing contests	Temporarily unlimited transfer of IP rights influences negative expectations of distributive fairness in crowdsourcing.
Mazzola et al. (2018)	What are the antecedents and consequences of IP arrangement choices in crowdsourcing?	Quantitative	Regression analysis: $N = 729$ projects	1 setting: • Crowdsourcing contests	1 element: • IP control	Project performance, in terms of contributors' self-selection to join crowdsourcing contests	Full transfer of IP ownership negatively influences contributors' self-selection to join a crowdsourcing contest.
Tekic and Willoughby (2020)	What IP arrangements do companies adopt in distinctive co-creation settings?	Qualitative	Descriptive analysis: $N = 111$ projects	2 settings: • Crowdsourcing contests • Virtual communities	5 elements: • IP control • Compensation • NDA • Additional agreements • Waiver option	No quantitative model	IP arrangements are composed of multiple elements. Commonly adopted IP arrangements vary across co-creation settings.

but that really limits what you can do. In crowdsourcing is all about having as many as possible people to participate, so NDAs are really a burden that you would ideally like to avoid." However, clarity is still needed about how different IP arrangements may influence co-creation project performance within and across co-creation settings.

2.3 | The research gap

Most of the previous research touching on our topic focuses primarily on other innovation management issues and provides only scattered evidence as to how companies tend to manage IP in co-creation. Research focused specifically on legal IP-related terms and conditions of co-creation projects is rare (i.e., de Beer et al., 2017; Franke et al., 2013; Mazzola et al., 2018; Tekic & Willoughby, 2020). Only a couple of previous studies investigate the effectiveness of IP arrangements outlined in project terms and conditions, addressing for example the topics of how IP arrangements influence expected distributive fairness in crowdsourcing (Franke et al., 2013) and how they influence contributors' self-selection to join crowdsourcing contests (Mazzola et al., 2018). While these studies provide some first insights, they focus exclusively on crowdsourcing contests without considering other co-creation settings such as virtual communities, single expert sessions, or lead user workshops. Furthermore, they operationalize IP arrangements as a one-dimensional construct, determining it as a degree of IP control, that is, transfer of ownership or licensing (Mazzola et al., 2018), or whether waiver option is included or not (Franke et al., 2013). More recent research has addressed the existence of multidimensional IP arrangements in two co-creation settings, namely crowdsourcing contests and virtual communities (Tekic & Willoughby, 2020). However, this research neither explores the effect of IP arrangements on performance of co-creation projects nor investigates the influence of specific co-creation settings on the effectiveness of different IP arrangements.

With our study we aim to close this gap by exploring the impact of five different IP arrangement elements—IP control, compensation structure, NDAs, additional agreements, and the waiver option—on project performance, operationalized in terms of outcome quality, stakeholder satisfaction, as well as time and budget performance, in four different co-creation settings, that is, crowdsourcing contests, virtual communities, single expert sessions and lead user workshops. Table 3 summarizes relevant studies upon which we have drawn to build our research, and further highlights the uniqueness and additional contributions of our study.

3 | IP ARRANGEMENTS AND CO-CREATION PROJECT PERFORMANCE: THE RESEARCH FRAMEWORK

To explore how IP arrangements influence performance of co-creation projects within and across specific settings, we have developed a research framework (Figure 2) based on a synthesis of configurational theory and contingency theory.

According to configurational theory (Misangyi et al., 2016), multidimensional managerial constructs can be considered only holistically, grouped together as a whole. The influence of each and every integrative element arises only from its complex interactions with other elements, characterized by multiple conjunctural causation, causal equifinality, and causal asymmetry (Fiss, 2011; Greckhamer et al., 2018; Misangyi et al., 2016). Thus, to investigate the impact of IP arrangements on co-creation project performance, in this study we see IP arrangements as configurations of multiple interconnected and mutually reinforcing elements that jointly—rather than individually—produce a combined impact on the performance of co-creation projects.

Conversely, contingency theory suggests that a managerial approach must fits its context to be effective (Drazin & van de Ven, 1985; Miller, 1981; Tidd, 2001). In other words, there is no universal "one size fits all" approach that is equally effective in all circumstances, but an ideal approach or a set of approaches that is more appropriate than others (Drazin & van de Ven, 1985; Miller, 1981). The better the fit between the context and the managerial approach, the higher the performance (Tidd, 2001). Thus, we assume that the effectiveness of an IP arrangement may depend on the co-creation setting and we expect there is only one or a few IP arrangements that specifically fit crowdsourcing contests, virtual communities, single expert sessions and lead user workshops, leading to high project performance in each of the settings. Figure 2 shows the proposed influence of IP arrangement configurations, consisting of multiple elements (i.e., IP control, compensation structure, employment of NDAs, additional agreements, and the waiver option) on co-creation project performance, which may be moderated by the specificities of a co-creation setting (i.e., crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops).

3.1 | IP arrangements as configurations of mutually reinforcing elements

To cope with IP-related challenges in co-creation, and with the goal of ensuring both value creation and value

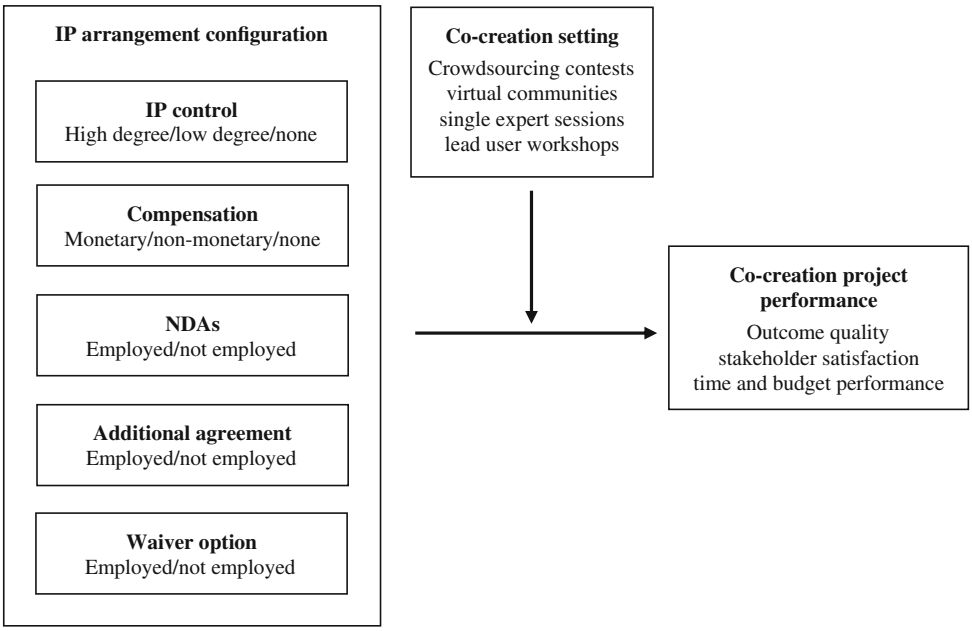

FIGURE 2 The research framework.

appropriation, companies tend to configure the elements outlined here, thereby creating a palette of IP arrangements they employ in co-creation projects. Previous studies have treated IP arrangements as one-dimensional constructs, investigating thereby the influence of individual elements of IP arrangements on performance of co-creation projects (Franke et al., 2013; Mazzola et al., 2018). Even though the multidimensional character of IP arrangements in co-creation has been recognized and asserted in previous research (Tekic & Willoughby, 2020), no attempt has thus far been made to empirically investigate complex interdependencies of mutually reinforcing elements of IP arrangements and their joint effect on co-creation project performance.

To make a step in this direction, in this study we build on the main premises of configurational theory (Fiss, 2007; Gresov & Drazin, 1997; Misangyi et al., 2016). Namely, we adopt multiple conjunctural causation, causal equifinality, and causal asymmetry as the main ontological assumptions of this study, thereby allowing us to embrace the complexity of the relationships between distinctive IP arrangements and co-creation project performance.

The assumption of *multiple conjunctural causation* is a formal expression of the idea that configurational elements must often combine to generate qualitative change and thus cannot be treated in isolation from one another. This implies that the effect of a single element of an IP arrangement may unfold only in combination with other elements. For example, as high degree of IP control via full transfer of ownership may be an inhibiting and demotivating factor for contributors to participate in co-creation (Benkler, 2017; Bogers & West, 2012; Dahlander & Gann, 2010; Henkel et al., 2014), it may be counter-balanced with high monetary compensation or employment of the waiver option as a part of the IP arrangement. Companies may also choose to forego IP control or employ non-exclusive licenses to foster value creation, while using NDAs to ensure IP protection and avoid potential consequences of low degree of IP control on prospects for value appropriation. In this way, various IP-arrangement elements allow companies to artfully balance between IP control and openness and ensure both value appropriation and value creation. Thus, in this study we consider IP control, compensation, NDAs, additional agreements, and the waiver option only as integrative and mutually reinforcing elements of an IP arrangement that allow companies to ensure both value creation and value appropriation. Thus, by explicitly assuming multiple conjunctural causation between distinctive IP-arrangement elements and co-creation project performance, we offer the following proposition:

> **Proposition 1.** *It is the combination of IP arrangement elements, rather than a single element independently, that leads to high or low co-creation project performance.*

Further, the assumption of *causal equifinality* formally expresses the idea that different configurations may generate the same level of project performance, implying their mutual non-exclusivity, even if the

contingencies are the same. By focusing on individual independent elements of IP arrangements, previous studies provided unifinal results indicating a single effective IP arrangement in crowdsourcing contests. For example, Franke et al. (2013) emphasize the importance of the waiver option, while Mazzola et al. (2018) emphasize the low degree of IP control. In this study, while taking into account the multiple IP arrangement elements, we explicitly assume that, even within the same co-creation setting, there may be a variety of IP arrangements that are equally effective, hence providing choice to project managers. Thus, we offer the following proposition:

> **Proposition 2.** *Multiple distinctive IP arrangements may lead to equivalent high or low performance of co-creation projects.*

Finally, the assumption of *causal asymmetry* suggests that IP arrangements influencing high project performance may be quite different from those influencing low project performance. Previous research assumes symmetry between "high-performance" and "low-performance" IP arrangements. Franke et al. (2013), for example, determined that IP arrangements that include the waiver option influence high project performance, while those that exclude it influence low project performance. Similarly, Mazzola et al. (2018) found that a low degree of IP control generates high project performance, while a high degree of IP control generates low project performance. In this study, we assume asymmetry between "high-performance" and "low-performance" IP arrangements. On this basis, we offer the following proposition:

> **Proposition 3.** *IP arrangements that lead to high and low performance of co-creation projects do not represent mirror-images of each other.*

3.2 | Moderating role of co-creation setting

In keeping with the tenets of contingency theory (Drazin & van de Ven, 1985; Miller, 1981), this study is grounded on the assumption that there is no universally effective IP arrangement for crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops. Not all co-creation projects are the same, and the settings in which they are embedded may influence the effectiveness of the IP arrangements employed.

Accordingly, crowdsourcing contests and virtual communities are employed by companies to integrate potential co-creators into their innovation projects in the *online* co-creation setting (Füller & Matzler, 2007; Haavisto, 2014; Piller & West, 2014). The literature emphasizes that the online environment is usually accompanied by the hazards of low trust and patentability concerns (Foege et al., 2019). On the other hand, lead user workshops and single expert sessions are employed by companies to establish face-to-face collaborative interaction with individual external contributors within the physical, *offline* co-creation setting. Solutions are developed within closed groups of people, allowing companies to maintain control over IP in the process. Companies use purposefully designed environments to stimulate creativity and to evoke an innovative spirit among contributors through brainstorming sessions, teamwork, or experimentation in living labs, fab labs, or ideation spaces (Dell'Era & Landoni, 2014; Leminen & Westerlund, 2019; Schmidt & Brinks, 2017).

Alternatively, when viewed from the vantage point of the relationship morphology of the company–contributor engagements rather than from the vantage point of the platform or medium of the engagements, crowdsourcing contests, and single expert sessions represent *company-to-one* co-creation settings, whereby each solution comes from a single contributor (Franke et al., 2013; Füller, 2006; Jeppesen & Lakhani, 2010; Tekic & Willoughby, 2019). In such settings, it is easier to track the origin of each contribution than in virtual communities and lead user workshops, where the development of a single solution takes place between a company and a group of contributors who work collectively on solving a specific problem. In such *company-to-many* co-creation settings the level of input recombination is high and it is practically impossible to track the importance of individual contributions (Franke et al., 2013; Tekic & Willoughby, 2020).

Varying according to the nature of the co-creation medium (i.e., *online* vs. *offline*), and the morphology of the co-creation engagement (i.e., *company-to-one* vs. *company-to-many*), crowdsourcing contests, virtual communities, single expert sessions and lead user workshops may call for different IP arrangements. Contingency theory asserts that a strategy or a managerial approach must fit its context to be effective and that, for every given context, there is an ideal strategy or set of strategies that fit better than others (Drazin & van de Ven, 1985; Miller, 1981). The better the fit between the contextual factors and strategy design, the higher the performance (Tidd, 2001). We thus assume that effectiveness of IP arrangements varies across different co-creation settings. On this basis, we offer the following proposition:

> **Proposition 4.** *Co-creation setting moderates the influence of IP arrangements on co-creation project performance.*

4 | METHODOLOGY

4.1 | Research setting and sample

Our dataset comprises 116 co-creation projects run by *OIconsult*, a consultancy company that acts as an open innovation intermediary between its client companies and potential individual external contributors. The company has a large co-creation project portfolio capturing a diversity of industries and product types. It organizes various kinds of co-creation projects for its clients (large international companies, as well as SMEs), ranging from crowdsourcing contests, through virtual communities, to single expert sessions and lead user workshops, while governing all aspects of project management.

Nevertheless, this project management function does not extend completely to how IP is handled in their co-creation projects. Even though the intermediary company provides its clients with a preliminary template of terms and conditions, the project's final terms and conditions are decided by the legal department of each client individually.

Thus, while providing a great variety of co-creation projects with regards to both co-creation settings and IP arrangements, *OIconsult* offers a unique research setting for this study aimed at determining the impact of different configurations of IP arrangements on project performance within and across various co-creation settings.

The overall data collection process comprised four stages, namely: (1) on-site collection of co-creation project documentation at the *OIconsult* premises; (2) qualitative coding of IP-arrangement elements (i.e., degree of IP control, compensation, employment of NDAs, additional agreements and the waiver option) by the means of content analysis of the projects' terms and conditions; (3) a survey aimed at collecting data on project performance from co-creation managers; and (4) classification of the projects into four co-creation settings (i.e., crowdsourcing contests, virtual communities, single expert sessions and lead user workshops).

In the first stage of our data collection process the company's complete database containing co-creation project documentation was reviewed. The documents—that provided detailed overviews and descriptions of the co-creation projects, as well as the projects' terms and conditions containing information about the IP arrangements employed—were collected through manual filtering. This procedure lasted 3 weeks and yielded a total of 3312 collected documents for 156 discrete co-creation projects. Due to the incomplete documentation regarding IP arrangements of 36 projects, the sample was reduced to 120 co-creation projects in the second data collection stage. Finally, as some project managers were no longer employed in the company, it was not possible to collect survey responses on performance of 4 co-creation projects in the third stage. This led to the reduction of the final sample to 116 co-creation projects, conducted in the timespan between 2006 and 2018, which were further classified into four co-creation settings in the final stage. By categorizing multiple co-creation projects into homogeneous types, we aimed to avoid unwarranted sample-wide generalizations and to identify the variety in relationships among the variables across the sub-samples of different co-creation settings.

The final sample includes a great variety of co-creation projects, not only in terms of IP arrangements and co-creation settings, but also in terms of industry and client companies. The 116 projects were managed for 74 different client companies, such as BMW, Audi, Adidas, Beiersdorf, Danone, Deutsche Telekom, Fujitsu, Volkswagen, Henkel, Siemens, and Unilever. Operating in a diverse range of industries, such as automotive, consumer products, home appliances, telecommunications, transportation and logistics, aerospace, pharmaceuticals, food processing, energy, baby products, and education, client companies included large international enterprises, SMEs and government (from 90 to 640,000 employees), based mainly in Germany and Austria, as well as in Denmark, Finland, France, Italy, Switzerland, the Netherlands, the United Kingdom and the United States, founded between 1845 and 2015.

4.2 | Measures

4.2.1 | Elements of IP arrangements in co-creation

We adopted a directed approach to content analysis (Hsieh & Shannon, 2005) of the co-creation projects' terms and conditions, and we performed qualitative coding of IP arrangements based on five predetermined elements (Table 4), namely, degree of IP control, compensation, NDAs, additional agreements, and the waiver option.

The first element of the IP arrangements was coded based on a scale indicating varying degrees of IP control, ranging from very strong IP control imposed by companies over co-creation outcomes (i.e., transfer of ownership, coded as 3), through strong IP control (i.e., exclusive license, coded as 2) and weak IP control (i.e., non-exclusive license, coded as 1), to no IP control over co-creation outcomes (i.e., no license or transfer of ownership employed, coded as 0).

The same scale was used for coding of the compensation structure included within IP arrangements,

TABLE 4 Qualitative coding of IP-arrangement elements.

Element	Attribute	Coding	No. of cases (%)
Degree of IP control	Transfer of ownership	3	52 (44.8%)
	Exclusive license	2	17 (14.7%)
	Non-exclusive license	1	38 (32.8%)
	No license or ownership transfer	0	9 (7.8%)
Compensation	Both monetary and non-monetary compensation	3	32 (27.6%)
	Monetary compensation	2	50 (43.1%)
	Non-monetary compensation	1	33 (28.4%)
	No compensation	0	1 (0.9%)
NDAs	NDA employed	1	53 (45.7%)
	No NDA employed	0	63 (54.3)
Additional agreements	Additional agreement employed	1	12 (10.3%)
	No additional agreement employed	0	104 (89.7%)
Waiver option	Waiver option employed	1	16 (13.8%)
	No waiver employed	0	100 (86.2%)

TABLE 5 Information on project performance construct measures.

Project performance: Construct measures ($\alpha = 0.91$; CR = 0.93; AVE = 0.65)	**FL**
1. Project outcome was of high quality.	0.86
2. Project was finished on time.	0.67
3. Project was finished within the specified budget.	0.62
4. Client company was satisfied with the project.	0.91
5. Co-creators were satisfied with the project.	0.85
6. Project team was satisfied with the project.	0.81
7. Top management was satisfied with the project.	0.87

Note: All factor loadings (FL) are significant at $p < 0.001$.
Abbreviations: α, Cronbach's alpha; AVE, average variance extracted; CR, composite reliability.

indicating different levels of compensation offered to co-creation participants, ranging from very high compensation (i.e., if the company offered both monetary and non-monetary compensation, coded as 3), through high compensation (i.e., if the company offered only monetary compensation, coded as 2) and low compensation (i.e., if the company offered only non-monetary compensation, coded as 1), to no compensation (i.e., if the company offered no compensation to participants, coded as 0).

Regarding the employment of NDAs, additional agreements and the waiver option, the elements were coded as 1 if they were included as part of the IP arrangements, and 0 if they were not employed.

The final sample showed significant variety in IP arrangements (Table 4). Across the whole sample, most of the projects involved a very high degree of IP control (44.8%), established through transfer of ownership rights from co-creators to initiating companies. Furthermore, most of the projects involved monetary compensation offered to co-creators for their effort and IP, either alone (43.1%) or complemented by non-monetary awards (27.6%). In contrast, NDAs are employed in less than half of the sample (45.7%), while additional agreements and the waiver option are very rarely employed as a part of IP arrangements, accounting for only 10.3% and 13.8% of cases, respectively.

4.3 | Co-creation project performance

To collect the data about co-creation project performance, we conducted a survey and asked project managers to rate the performance of each project by indicating on a 5-point Likert scale (from strongly disagree to strongly agree) the degree to which: (1) the project outcome was of high quality; (2) the project was finished on time; (3) the project was finished within the specified budget; (4) the client company was satisfied; (5) the co-creators were satisfied; (6) the project team was satisfied; and (7) top management was satisfied. The survey responses were collected from 12 project managers who were directly in charge of specific projects.

The average score of the seven items was used to measure performance of each rated co-creation project. The factor loadings show sufficient variance explained by the project performance variable for particular items measured (Table 5). The combined scale shows high

TABLE 6 Descriptive statistics and correlations.

	Mean	Min	Max	SD	1	2	3	4	5	6
1. Degree of IP control	1.97	0.00	3.00	1.04	1					
2. Compensation	1.97	0.00	3.00	0.77	0.04	1				
3. NDA	0.46	0.00	1.00	0.50	−0.42**	−0.22*	1			
4. Additional agreement	0.10	0.00	1.00	0.31	−0.04	0.20*	−0.08	1		
5. Waiver option	0.14	0.00	1.00	0.35	0.33**	0.05	−0.02	0.44**	1	
6. Performance	3.93	1.29	5.00	0.82	−0.11	−0.05	0.43**	0.06	0.01	1

Note: $N = 116$. Dummy coding for NDA, additional agreement, and waiver option (1 = element included; 0 = element not included).
*$p < 0.05$; **$p < 0.01$.

construct reliability and validity ($\alpha = 0.91$; CR = 0.93; AVE = 0.65).

The average performance score in the final sample of 116 co-creation projects is 3.93, with minimum and maximum at 1.29 and 5.0, respectively, and a standard deviation of 0.82. Table 6 shows the descriptive statistics for each construct and their correlations.

4.3.1 | Co-creation settings

Based on the documentation and with the ongoing support of the *OIconsult* project managers, each co-creation project was classified according to its co-creation setting (i.e., crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops). Within the final sample of 116 co-creation projects, 63 were classified as crowdsourcing contests, 19 as virtual communities, 4 as single expert sessions, and 30 as lead user workshops. Projects focused primarily on product or service development, asking for new ideas, concepts, or experience-based input related to, for example, new car interiors, the next generation of children's medication, the future of cosmetics, or lifestyle electronics design.

Crowdsourcing contests were organized on online platforms, which were either branded by the client company or run under the brand of the *OIconsult* intermediary. Even though the contests aimed at collecting a substantial number of submissions, each of them resulted in a solution from a single contest participant (i.e., company-to-one co-creation). In contrast to crowdsourcing contests that were mainly open for the public, *virtual communities* were typically closed and participants joined by invitation. Organized in an online co-creation setting, where participants were expected to team up and jointly contribute to the project (i.e., company-to-many co-creation), virtual communities aimed to collect participants' input that would further guide product or service development. Finally, single expert sessions and lead user workshops were organized in an offline, face-to-face co-creation setting, typically at the *OIconsult* premises. In *single expert sessions* individual experts were invited to share their ideas or perspective in relation to specific (existing or future) products or services with project managers (i.e., company-to-one co-creation). Conversely, *lead user workshops* involved 8–12 participants, primarily product or service users, who took part in ideation or design thinking workshops led by project managers, aiming to jointly develop new concepts or prototypes (i.e., company-to-many co-creation).

4.4 | Data analysis

While assuming the moderating role of the co-creation setting (i.e., crowdsourcing contests, virtual communities, single expert sessions and lead user workshops), we employ fuzzy-set Qualitative Comparative Analysis (fsQCA) here to identify the mutual influence of configurational elements of IP arrangements (i.e., IP control, compensation, NDAs, the waiver option, and additional agreements) on the outcome (i.e., high and low co-creation project performance). We choose to employ this method as it provides the ontological and epistemological foundation for configurational theory that we adopt in this study (Greckhamer et al., 2018). The fsQCA method takes into account the assumptions of multiple conjunctural causation, causal equifinality, and causal asymmetry, and as such is ideally suited to our purpose of capturing complex relationships between multiple elements of IP arrangements (represented here as fsQCA conditions, or independent variables), and high and low co-creation project performance (represented here as fsQCA outcomes, or dependent variables) in each of the four co-creation settings.

Grounded in set theory and Boolean algebra, fsQCA enables researchers to simplify the complex causal relationships into ideal types, each of which represents a unique combination of the configurational elements that are believed to jointly and synergistically determine the relevant outcomes (Fiss, 2007; Marx et al., 2014). Qualitative Comparative Analysis was introduced by Charles C. Ragin

in 1987, as an inductive, theory-building research methodology. Its application, specifically the application of fsQCA, has recently increased significantly in innovation management studies (e.g., Goduscheit & Faullant, 2018; Hofman et al., 2017; Sukhov et al., 2021; Thornton et al., 2019).

The fsQCA method captures high degrees of complexity while also preserving to a great extent the richness of the data, by allowing fine-grained assessment of set membership (Ragin, 2008). It does not treat the membership of phenomena in sets as being either absent or present, but rather as varying according to the degree to which they satisfy membership criteria, starting from the value 0 (entirely out) to the value 1 (entirely in). However, even though fsQCA enables the analysis of sets with an infinitely large number of possible degrees of membership, this technique also allows the analysis of crisp sets, with values of 0 and 1, lying on the extremes of the fuzzy set continuum.

All analytical fsQCA steps, namely calibration of measures, analysis of necessity, and analysis of sufficiency, as well as two robustness tests, were conducted using the R Studio QCA package (Dusa, 2019). Following the fsQCA procedure articulated by Ragin (2008), Schneider and Wagemann (2012), and Dusa (2019), each of the analytical steps will now be described in detail.

4.4.1 | Calibration of measures

The next step in our data analysis was the calibration of measures—a fundamental operation in fsQCA (Dusa, 2019)—which was achieved by transforming raw numerical data into fuzzy-set membership scores that express the degree to which cases belong to a set (Schneider & Wagemann, 2012). We used the direct method of calibration (Ragin, 2008), which required specification of values corresponding to qualitative anchors that structure a fuzzy set (Table 7), namely, full membership (1), full non-membership (0), and crossover point (0.5).

The qualitative anchors for the two fuzzy sets dealing with project performance were defined based on the percentile and average scores. Membership in the "high co-creation performance" set was coded 0 if project performance showed a score lower than or equal to 3.33 (i.e., the 25th percentile) and was coded 1 if project performance showed a score higher than or equal to 4.63 (i.e., the 75th percentile). The average score of the whole sample (3.92) was chosen as the crossover point, to determine above-average and below-average performance in co-creation. Membership in the "low co-creation performance" set was coded as the negation of the measure of high performance described above (1 for low performance and 0 for high performance). In sum, the calibrated data for the two outcome sets covered the full spectrum of raw performance data.

To calibrate the condition sets of "IP control" and "compensation," the following thresholds were used: 3 as a maximum value for full membership, 0 as a minimum value for full non-membership, and the midpoint of 1.5 as an average value for the crossover point. Given that they exhibited the characteristics of crisp sets, there was no need for calibration of the condition sets of "NDAs," "additional agreements" and the "waiver option." The value of 1 was used for full membership, and the value of 0 was used for full non-membership; no value was defined for the crossover point.

4.4.2 | Analyses of necessity and sufficiency

To determine the impact of IP arrangements on project performance within and across various co-creation settings, we conducted the analyses of necessity and sufficiency separately for crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops.

Necessity analysis was performed to identify necessary conditions that were truly relevant for the outcome of

TABLE 7 Specification of qualitative anchors.

	Set type	Threshold full non-membership	Crossover point	Threshold full membership
fsQCA outcome sets				
High co-creation performance	Fuzzy	3.33 (25th percentile)	3.92 (average)	4.63 (75th percentile)
Low co-creation performance	Fuzzy	4.63 (75th percentile)	3.92 (average)	3.33 (25th percentile)
fsQCA condition sets				
Degree of IP control	Fuzzy	0 (minimum)	1.5 (average)	3 (maximum)
Compensation	Fuzzy	0 (minimum)	1.5 (average)	3 (maximum)
NDAs	Crisp	0 (minimum)	—	1 (maximum)
Additional agreements	Crisp	0 (minimum)	—	1 (maximum)
Waiver option	Crisp	0 (minimum)	—	1 (maximum)

interest. We set the consistency threshold at 0.9 and the threshold for relevance of necessity at 0.6, following the recommendations of Schneider and Wagemann (2012). Even though a necessary condition might not be enough to produce the outcome on its own, it is always present when the outcome is present, representing a superset of the outcome.

Conversely, a condition or a combination of conditions is defined as sufficient if it leads to the outcome of interest. In other words, when a sufficient condition is present, the outcome is also present (i.e., a sufficient condition represents a subset of the outcome). Analysis of sufficiency relations is supported by the truth table analysis and logical minimization algorithms that are required to identify the minimal configurations of conditions that are sufficient for the outcome of interest. Given the exploratory character of this study and our interest in all possible solutions (Schneider & Wagemann, 2012), the frequency threshold (i.e., number of cases in a configuration) was set to 1, while the consistency threshold was set to the minimal recommended value of 0.75. As a low coverage score is not considered to express theoretical irrelevance, no threshold for coverage was set in the analysis.

By applying the rules of Boolean algebra, the empirical evidence contained in the truth table is minimized into "high co-creation performance" and "low co-creation performance" solutions for IP arrangements within and across the four co-creation settings. In each of the solutions the core and the peripheral conditions are defined; the core conditions are the essential configurational elements for which the empirical evidence indicates a strong relationship with the outcome of interest, and the peripheral conditions are the elaborating elements that reinforce the central features of the core (Fiss, 2011).

4.4.3 | Robustness tests

Following the recommendations of Schneider and Wagemann (2012), the first robustness test involved modifying the consistency thresholds employed in the fsQCA procedure. To test the robustness of the results, we raised the consistency threshold from the original value of 0.75 to more rigorous value of 0.8.

The second robustness test involved modifications in the calibration of data related to the outcome of interest in this study, that is, co-creation project performance. Instead of the percentile-based approach that is typically used for calibration of interval data (as in Fiss, 2011), we defined qualitative breakpoints based on the scores on the Likert scale, following Emmenegger et al. (2014). Even though the half-way point on a 5-point Likert scale is 3 (with a minimum of 1 and a maximum of 5), it cannot be considered as a qualitative crossover point between high performance and low performance projects. In other words, the score of 3 on a Likert scale—meaning "neither, nor"—is considered to be more out of the set, along with the scores of 1 and 2, while the scores of 4 and 5 are considered to be inside the set; the crossover point is considered to be between the scores of 3 and 4 in this case (Dusa, 2019). Thus, a score of 3.5 was chosen as the crossover point for calibrating our performance data in the second robustness test. In this way, membership in the set of high co-creation performance was coded 0 if the project performance score was lower than or equal to 3, and it was coded 1 if the project performance score was higher than or equal to 4. Conversely, membership in the set of low performance projects was coded as the negation of the measure of high performance described above (i.e., 1 for low performance and 0 for high performance).

5 | RESULTS

This section presents the results of the fsQCA method applied to analyze the influence of IP arrangements on co-creation project performance in each of the four different co-creation settings. Table 8 shows the fsQCA solutions covering high-performance and low-performance IP arrangements in these settings. For each solution consistency, raw coverage and unique coverage are reported. Table 8 also shows overall solution consistency and overall solution coverage in different settings related to both high and low co-creation performance.

None of the single conditions, namely IP control, compensation, NDAs, additional agreements, or the waiver option, are sufficient for high or low performance in co-creation on their own in any of the four co-creation settings. They all represent INUS conditions, that is, insufficient conditions that are a necessary part of a solution which is unnecessary but sufficient for the outcome (Schneider & Wagemann, 2012).

Also, there is no IP-arrangement element identified as a relevant necessary condition for either high or low project performance in any of the four co-creation settings, namely crowdsourcing contests, virtual communities, single expert sessions and lead user workshops.

5.1 | High-performance and low-performance IP arrangements in crowdsourcing contests

Implementation of the fsQCA procedure enabled identification of one high co-creation performance solution (HPERF 1.1) and two low co-creation performance solutions (LPERF 1.1 and LPERF 1.2) in the first co-creation setting—crowdsourcing contests (Table 8).

TABLE 8 Summary of the fsQCA results.

Co-creation settings	Crowdsourcing contests			Virtual communities			Single expert sessions			Lead user workshops			
fsQCA solutions	HPERF 1.1	LPERF 1.1	LPERF 1.2	HPERF 2.1	HPERF 2.2	LPERF 2.0	HPERF 3.1	HPERF 3.2	LPERF 3.0	HPERF 4.1	HPERF 4.2	HPERF 4.3	LPERF 4.1
Conditions:													
Degree of IP control		⊙	●	⊙		No solution	●		No solution	⊙	●		●
Compensation	●		●		●			●				●	⊙
NDA	⊙	⊙	⊙	●	●		●	●		●	●	●	●
Additional agreement	●	⊙	⊙	⊙	⊙		⊙	⊙		●	⊙	⊙	●
Waiver option	⊙	⊙	●	⊙	⊙		⊙	⊙		⊙	●	⊙	●
Single solution consistency and coverage:													
Consistency	0.99	0.84	0.98	0.84	0.82	–	1.00	1.00	–	0.83	0.75	0.75	1.00
Raw coverage	0.07	0.29	0.03	0.75	0.71		0.55	0.68		0.13	0.22	0.47	0.07
Unique coverage	–	0.29	–	0.09	0.05		0.25	0.37		0.13	0.22	0.47	–
Overall solution consistency and coverage:													
Overall consistency	0.99	0.85		0.84		–	1.00		–	0.76		1.00	
Overall coverage	0.07	0.33		0.80			0.93			0.81		0.07	

Note: Following Fiss (2011) notation, black circles (●) indicate the presence of a condition and white circles (⊙) indicate its absence. Large circles indicate core conditions and small circles indicate peripheral conditions. Blank spaces indicate conditions of indifference (i.e., "do not care" conditions).

The HPERF 1.1 solution indicates that IP arrangements in crowdsourcing contests that include monetary compensation and additional agreements, but exclude NDAs and the waiver option, generate high co-creation project performance. IP control appears in this solution as a condition of indifference; in other words, both a high degree of IP control (i.e., transfer of ownership or exclusive licensing arrangements) and a low degree of IP control (i.e., non-exclusive and or licensing arrangements) may be a part of this configuration. Employment of the additional agreement and exclusion of waiver options are emphasized as the core conditions of the HPERF 1.1 solution.

On the other hand, the LPERF 1.1 solution indicates that IP arrangements in crowdsourcing contests that are based on a low degree of IP control and exclude NDAs, additional agreements, and the waiver option, generate low project performance in this co-creation setting. Compensation appears in this solution as a condition of indifference; in other words, both monetary and non-monetary compensation may be a part of this configuration. A low degree of IP control and the exclusion of additional agreements from IP arrangements in crowdsourcing contests are emphasized as the core conditions of the LPERF 1.1 solution. Conversely, the LPERF 1.2 solution represents an IP arrangement based on a high degree of IP control, while emphasizing monetary compensation, the waiver option, and the omission of additional agreements as its core conditions. Similar to the previous solutions, LPERF 1.2 excludes NDAs from the configuration. As non-employment of NDAs is omnipresent across the whole sample of crowdsourcing contests, it appears as an INUS condition in all of the solutions, regardless of the outcome in question.

These results remain completely unchanged with the modifications of the consistency threshold in the first robustness test. Nevertheless, the second robustness test led to slight changes by generating three solutions related to the high co-creation performance. Two of these solutions offer a very strong confirmation of the HPERF 1.1 solution. By showing an increase in coverage of the solutions with additional agreements as core conditions to 0.17, they confirm the importance of additional agreements in configuring effective IP arrangements in crowdsourcing contests. No other condition is identified as a core condition in any of the two solutions. The third solution offers a novel insight by exposing a supplementary IP arrangement related to high-performance projects, based on a high degree of IP control, complemented with the core conditions of non-monetary compensation and employment of the waiver option. In this test, no solution is identified as related to low co-creation performance.

5.2 | High-performance and low-performance IP arrangements in virtual communities

Implementation of the fsQCA procedure enabled identification of two high co-creation performance solutions (HPERF 2.1 and HPERF 2.2), while offering no low co-creation performance (LPERF) solutions, in the second co-creation setting—virtual communities (Table 8).

The HPERF 2.1 solution indicates that IP arrangements that are based on a low degree of IP control

(i.e., non-exclusive or no licensing agreements), include NDAs, but exclude additional agreements and the waiver option, generate high co-creation project performance in virtual communities. Compensation appears as a condition of indifference, that is, both monetary and non-monetary compensation may be included in such IP arrangements. Conversely, the HPERF 2.2 solution indicates that IP arrangements that include monetary compensation and NDAs, but exclude additional agreements and the waiver option, are another pathway to high co-creation project performance in this setting. IP control acts as a condition of indifference (i.e., both high and low degree of IP control may be included in such arrangement). Employment of NDAs and the exclusion of additional agreements and the waiver option are emphasized as the core conditions of HPERF 2.1 and HPERF 2.2 solutions.

The results remain completely unchanged with the modifications to the analytical parameters in the two robustness tests.

5.3 | High-performance and low-performance IP arrangements in single expert sessions

Implementation of the fsQCA for the third co-creation setting—single expert sessions—enabled identification of two high-performance solutions (HPERF 3.1 and HPERF 3.2). No solution (LPERF) was identified as generating low performance of the co-creation projects in this setting (Table 8).

The HPERF 3.1 solution indicates that IP arrangements that are based on a high degree of IP control (i.e., transfer of ownership or exclusive licensing agreements), include NDAs, but exclude additional agreements and the waiver option, generate high co-creation project performance in single expert sessions. Compensation appears as a condition of indifference, that is, both monetary and non-monetary compensation may be included in such an IP arrangement. Conversely, the HPERF 3.2 solution indicates that IP arrangements that include monetary compensation and NDAs, but exclude additional agreements and the waiver option, are another pathway to high co-creation project performance in this setting. IP control acts as a condition of indifference (i.e., both high and low degree of IP control may be included in such arrangement). The employment of NDAs and the exclusion of additional agreements and the waiver option are emphasized as the core conditions of HPERF 3.1 and HPERF 3.2 solutions.

The results remain completely unchanged with the modifications to the analytical parameters in the two robustness tests.

5.4 | High-performance and low-performance IP arrangements in lead user workshops

Implementation of the fsQCA procedure for the fourth co-creation setting—lead user workshops—enabled identification of three high-performance solutions (HPERF 4.1, HPERF 4.2 and HPERF 4.3) and one low-performance solution (LPERF 4.1; see Table 8).

The HPERF 4.1 solution indicates that IP arrangements that are based on a low degree of IP control, include NDAs and additional agreements, but exclude the waiver option, generate high co-creation project performance in lead user workshops. Compensation appears as a condition of indifference, while a low degree of IP control, employment of additional agreements, and exclusion of the waiver option are emphasized as core conditions of this solution. Conversely, the HPERF 4.2 solution indicates that IP arrangements that are based on a high degree of IP control, include NDAs and the waiver option, but exclude additional agreements, may also generate high co-creation project performance in lead user workshops. Compensation appears as a condition of indifference, while exclusion of additional agreements and employment of the waiver option are emphasized as core conditions of this solution. Finally, the HPERF 4.3 solution indicates that IP arrangements that include monetary compensation and NDAs, but exclude additional agreements and the waiver option, are another pathway to high co-creation project performance in lead user workshops. IP control appears as a condition of indifference, while monetary compensation and exclusion of additional agreements are emphasized as core conditions of this solution.

On the other hand, the LPERF 4.1 solution represents IP arrangements based on employment of a high degree of IP control, non-monetary compensation, additional agreements, and the waiver option as core conditions, complemented by NDAs. As employment of NDAs is omnipresent across the whole sample of lead user workshops, it appears as an INUS condition in all the solutions, regardless of the outcome in question.

The first robustness test led to slight modifications in solutions covering IP arrangements in lead user workshops, related only to high co-creation performance. Namely, while the solution HPERF 4.1 stays unaffected, the solutions HPERF 4.2 and HPERF 4.3 are integrated into a single solution. In this solution high degree of IP control and monetary compensation become the solution's core conditions, increasing emphasis on the importance of these IP-arrangement elements for achieving high co-creation performance in lead user workshops. The waiver option, as the

differentiating condition between the original two solutions, is identified as the condition of indifference. Conversely, the modified fsQCA results from the second robustness test affirmed both the original high-performance solutions (HPERF 4.1 and HPERF 4.2), as well as the original low-performance solution (LPERF 4.1). The solution with the indifferent condition of IP control (HPERF 4.3) is not identified as a part of the results of this robustness test.

6 | DISCUSSION OF THE RESULTS

Integration of the contingency and configurational perspectives in this study enables us to understand more deeply the influence of different IP arrangements on project performance within and across a variety of co-creation settings. Based on the assumption that different co-creation settings call for specific configurations of IP arrangements that correspond to existing contextual contingencies, application of the *fuzzy-set Qualitative Comparative Analysis* (*fsQCA*) generated novel and original insights about effective IP arrangements in co-creation. While showing clearly that the co-creation setting moderates the influence of IP arrangements on co-creation project performance, our results also meet the assumptions of the configurational perspective adopted in this study (i.e., multiple conjunctural causation, causal equifinality, and causal asymmetry). In short, there is no single element of IP arrangements identified as generating co-creation performance on its own, but only in combination with other elements. Further, there are multiple distinctive IP arrangements identified as having the same effect on co-creation project performance. Finally, effective and ineffective IP arrangements are shown to be asymmetrical, and not the mirror-images of each other (Table 8).

In this section, we discuss these insights in more depth and use qualitative case knowledge from our sample of 116 co-creation projects to illustrate effective IP arrangements in crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops.

In *crowdsourcing contests*, the results of applying fsQCA indicate that effective IP arrangements are primarily based on the employment of additional agreements and monetary compensation. To generate high co-creation performance, such arrangements exclude NDAs and the waiver option, and may involve both a high degree of IP control (i.e., transfer of ownership or exclusive licensing agreements) and a low degree of IP control (i.e., non-exclusive or no licensing agreements).

Accordingly, additional agreements represent a condition that exhibits a clear contrast in comparison between high and low-performance solutions in crowdsourcing contests. Even though the employment of additional agreements appears as the core condition in the fsQCA solution covering a very small number of high-performing projects, their exclusion appears as the core condition in the two solutions covering around one-third of the low-performing projects. Also, the robustness tests strongly confirmed these results. By showing a significant increase in the coverage of the solutions that include additional agreements as their only core condition, the robustness tests confirm the importance of additional agreements in configuring IP arrangements in crowdsourcing contests.

Additional agreements appear to be the most rarely used element in configuring IP arrangements in co-creation (Table 6). However, they may significantly empower a company's approach to IP management in crowdsourcing contests. Namely, additional agreements allow a company to eschew imposing a high degree of IP control on co-creation outcomes—that previous research has considered to be an essential element of IP arrangements in crowdsourcing contests (de Beer et al., 2017; Foege et al., 2019; Mazzola et al., 2018; Mortara et al., 2013)—while still ensuring appropriation of value for the company from those outcomes. Regardless of the degree of IP control employed, and in addition to monetary prizes, effective IP arrangements in crowdsourcing contests within our data set typically promise subsequent payment or follow-up arrangements with co-creators, "*if and when a submitted solution will be commercially retailed by the company or one of its affiliates*" (an excerpt from a project's terms and conditions). Such an approach also offers co-creators a promise of more serious engagement in the subsequent stages of product innovation, as well as a promise of greater benefits from further collaboration. Nevertheless, previous research has largely ignored the importance of additional agreements for developing effective IP arrangements in crowdsourcing contests. Conversely, concurring with insights from the innovation management literature (de Beer et al., 2017; Franke et al., 2013; Lauritzen & Karafyllia, 2018; Terwiesch & Xu, 2008), our fsQCA results emphasize the importance of employment of monetary rewards in crowdsourcing contests, as a required complementary element to additional agreements.

Further, in *virtual communities*, the results of fsQCA indicate that effective IP arrangements exclude additional agreements and the waiver option, but employ NDAs, complemented by: (1) a low degree of IP control (i.e., non-exclusive or no licensing agreements), regardless of the compensation, or (2) monetary compensation, regardless of the level of IP control.

NDAs indeed represent the crucial element of IP arrangements in virtual communities, bearing in mind

that the high performing projects within our data set typically take the form of closed online communities. Companies aim to keep the content confidential, so NDAs are an irreplaceable tool for such arrangements (Enkel et al., 2005; Foege et al., 2019; Lauritzen, 2017; Tekic & Willoughby, 2020). The co-creators sign NDAs, agreeing to keep all the information confidential and not to disclose it to any third party. Companies also offer a symbolic monetary reimbursement (typically 30–50 EUR) to all the co-creators for their participation and effort in the co-creation project, while typically obtaining a non-exclusive license to the co-creation outcomes. These results concur with the literature suggesting that companies would need to employ more permissive licensing arrangements to support collective creativity in co-creation (Albors et al., 2008; Benkler, 2017; Harwood & Garry, 2014).

Similarly, in *single expert sessions*, the results of fsQCA indicate that effective IP arrangements exclude additional agreements and the waiver option, but employ NDAs, complemented by: (1) a high degree of IP control (i.e., transfer of ownership or exclusive licensing agreements), regardless of the compensation, or (2) monetary compensation, regardless of the level of IP control.

As in the case of virtual communities, NDAs are emphasized as core elements of effective IP arrangements in single expert sessions. Namely, both fsQCA solutions related to high-performance projects emphasize NDAs as their core condition. To ensure that all information shared between the co-creators and the initiating company remains confidential, experts are required to sign NDAs when participating in co-creation. Typically, they are entitled to monetary compensation for their participation and effort, while all resulting "*ideas, discoveries and inventions are the property of the company, and the company is entitled to all IP rights, including patents*" (an excerpt from a project's terms and conditions). Such arrangement allows companies to fully control the co-creation outcomes and exploit them in further stages of the product innovation process. Our findings concur with the insights of the innovation management literature suggesting that companies tend to employ more restrictive IP arrangements in co-creation with individual experts (Chatterji & Fabrizio, 2014).

Finally, with regards to *lead user workshops*, the results of fsQCA indicate that effective IP arrangements employ NDAs, complemented by: (1) a low degree of IP control and additional agreements, while excluding the waiver option, or (2) a high degree of IP control and the waiver option, while excluding additional agreements, or (3) monetary compensation, while excluding both additional agreements and the waiver option.

While securing confidentiality by the NDAs, all types of IP arrangements give the initiating company the opportunity to reconcile the interests of all parties involved, while securing high co-creation performance. To ensure success of co-creation in lead user workshops, companies may choose to establish low IP control at the beginning, sometimes even by completely avoiding any kind of licensing arrangements, and then subsequently specifying licensing arrangements with co-creators as part of additional agreements in case of their eventual interest in realizing co-creation outcomes. Such an insight concurs with previous research suggesting that, to support collective creativity, companies would need to assert a low degree of IP control and employ more permissive licensing arrangements (Albors et al., 2008; Benkler, 2017; Harwood & Garry, 2014). Conversely, companies may also choose to impose a high degree of IP control in lead user workshops straightforwardly through the co-creation project's terms and conditions—for example, *all resulting* "*ideas, discoveries, and inventions are the property of the company, and the company is entitled to all IP rights, including patents*"—while promising to waive these rights if the company decides not to use the co-creation outcomes in the specific period of time. Such an insight concurs with the previous research suggesting more restrictive IP arrangements in lead user workshops (Brem et al., 2018; Lilien et al., 2002). Finally, our results also show that putting the emphasis on monetary compensation in lead user workshops allows companies to choose among various degrees of IP control, as all participants involved are paid for their time and effort dedicated to the co-creation project.

Table 9 provides an overview of the effective IP arrangements in crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops educed from insights from the application of fsQCA in this empirical study. Along the lines of our initial propositions derived from configurational theory and the contingency theory, our results show that effective IP arrangements are based on different combinations of IP control, compensation, NDAs, additional agreements, and the waiver option, both within and across co-creation settings, emphasizing both the configurational and context-dependent character of the influence of IP management on co-creation project performance.

7 | IMPLICATIONS FOR RESEARCH

This study makes three primary contributions to the innovation management literature focused on IP management in co-creation, and open innovation in general.

TABLE 9 Overview of effective IP arrangements within and across co-creation settings.

Co-creation setting	Elements to include	Excerpts from effective IP arrangements
Crowdsourcing contests	*Setting 1—Option 1*: Monetary compensation Additional agreements	"All submitted designs have the opportunity to win cash prizes amounting to a total of 5000 EUR and a lot of publicity and exposure [...] If and when a submitted design will be commercially retailed by the company or one of its affiliates, the submitter of that design will receive a one-time reimbursement of 1500 EUR."
Virtual communities	*Setting 2—Option 1*: NDAs Low degree of IP control	"Confidential information and results obtained within the framework of the project may not be passed on to third parties and may not be used in any way that could be harmful to the company [...] In addition, the company reserves the right to include the contributions in any development processes or project implementations."
	Setting 2—Option 2: NDAs Monetary compensation	"The content of this community is strictly confidential. Any participants who share or comment on any information regarding the content or the research itself with third parties, especially on social media platforms such as Facebook and Twitter, will be immediately removed from the community, will be denied the compensation, and run the risk of further legal consequences [...] Participants are offered 70 GBP incentive for their participation in the community."
Single expert sessions	*Setting 3—Option 1*: NDAs High degree of IP control	"By participating in the project, the participant agrees not to disclose confidential information that he receives in connection with the project to third parties and not to use it in any way that could be harmful to the company [...] The participant shall, during and after participation in the project, immediately inform the company in writing and verbally of all ideas, discoveries and inventions resulting from the participant's knowledge of the company's secret information. The participant assigns the rights and legal claims to these ideas, discoveries and inventions to the company."
	Setting 3—Option 2: NDAs Monetary compensation	"By participating in the project, the participant agrees not to disclose confidential information that he receives in connection with the project to third parties and not to use it in any way that could be harmful to the company [...] The participant will receive an incentive of 120 EUR for this activity."
Lead user workshops	*Setting 4—Option 1*: NDAs Low degree of IP control Additional agreement	"By participating in the project, the participant agrees to keep all information secret and not to pass it on to third parties [...] The agreement does not grant either party any license or other right to use the other party's confidential information [...] In the case of further research, development or other contracts, rights, licenses and other rights of use to confidential information are regulated separately."
	Setting 4—Option 2: NDAs High degree of IP control Waiver option	"By participating in the workshop, the participant agrees not to disclose confidential information to third parties and not to use it in any way that could be harmful to the company [...] The participant assigns the rights and legal claims to developed ideas, discoveries and inventions to the company [...] The company may waive protected or non-protected inventions made by the participant that the company does not wish to use."
	Setting 4—Option 3: NDAs Monetary compensation	"The participant agrees not to pass on any verbal or written information obtained directly or indirectly during the workshop, as well as any results generated there, to third parties without the prior written consent of the company and to take all reasonable precautions to prevent third parties from accessing this information [...] The company offers compensation of 550 EUR to workshop participants."

First, by identifying *effective IP arrangements within and across a variety of co-creation settings*, our study adds directly to the embryonic research in the literature investigating legal terms and conditions that companies employ in their collaborative innovation endeavors with *individual external contributors* (de Beer et al., 2017; Franke et al., 2013; Mazzola et al., 2018; Tekic & Willoughby, 2020). Our study shows that different IP arrangements have different effects on co-creation performance in crowdsourcing contests, virtual communities, single expert session, and lead user workshops, requiring companies to customize their approach to IP management to fit specific co-creation settings.

Second, building on the idea of the configurational character of IP arrangements (Tekic & Willoughby, 2020), our study provides evidence of the

interdependence of multiple IP-arrangement elements and their joint influence on co-creation project performance. Even though the innovation management literature indicates that there is a variety of elements that may be used as building-blocks of IP arrangements (de Beer et al., 2017; Foege et al., 2019; Franke et al., 2013; Lauritzen, 2017; Mazzola et al., 2018; Tekic & Willoughby, 2020), previous research focused primarily on the influence of a single element of IP arrangements on co-creation project performance, for example, the degree of IP control (Mazzola et al., 2018) or the waiver option (Franke et al., 2013), while leaving other elements (i.e., compensation, additional agreements, and NDAs) beyond the scope of analysis. In contrast, this study demonstrates clearly that the effect of IP arrangements on co-creation performance is multidimensional in its character. Even though previous research looking into different elements of IP arrangements in co-creation has been published (Tekic & Willoughby, 2020), this is the first study to investigate how specific configurations of different IP-arrangement elements influence co-creation project performance. Understanding IP arrangements as configurations of different elements—that is, IP control, compensation, NDAs, additional agreements, and the waiver option—allowed us to define their points of distinction and similarity and to identify, articulate and empirically verify the alternative IP arrangements that are effective within and across specific co-creation settings, each of which is based on distinctive configurations of mutually reinforcing elements. These insights broaden our understanding of the complementarity effects that various elements of IP arrangements have on a company's success in co-creation, while concurring with the main premises of configurational theory (Fiss, 2007; Greckhamer et al., 2018; Misangyi et al., 2016). In short, our results show that: (1) different elements of IP arrangements interact and combine to mutually generate co-creation project performance (the assumption of multiple conjunctural causation); (2) there may be multiple IP arrangements that generate the same level of co-creation project performance (the assumption of causal equifinality); and (3) high-performance and low-performance IP arrangements are not symmetrically opposite (the assumption of causal asymmetry). In this way, our findings contribute to configurational theory by showing that IP arrangements in co-creation should be considered as a configurable bundle consisting of multiple interdependent elements that can and have to be carefully combined, rather than treated as a "monolithic" one-size-fits-all approach to IP management in co-creation. Adoption of configurational theory helped us to unravel certain heuristics regarding how co-occurrence and mutual exclusion of specific IP-arrangement elements create or diminish value. With the support of the fsQCA method we were able to identify the elements that need to be combined to add value, as well as those that decrease value if they are combined, determining thereby the underlying rules of IP-arrangement design in co-creation. Such findings thus evoke the value of further exploring of the applicability of configuration theory in future innovation management research.

Third, by recognizing that *the effect of IP arrangements on co-creation project performance is context-dependent*, this study contributes to the literature by going beyond previous research that has largely overlooked the variety of co-creation settings, due to its intense focus on effective IP arrangements in crowdsourcing contests (Franke et al., 2013; Mazzola et al., 2018), while neglecting other co-creation settings. Research addressing IP management in different co-creation settings is rare (Alexy et al., 2009; Felin & Zenger, 2014; Tekic & Willoughby, 2020) and, in particular, it has failed to investigate the influence of *specific IP arrangements* on co-creation project performance across different settings. In contrast with previous research, this study explicitly adopts the contingency perspective on IP management in co-creation, and not only deepens the insights of previous research focused on determining the influence of IP arrangements on performance in crowdsourcing contests, but also provides novel evidence of their influence on performance in virtual communities, single expert sessions and lead user workshops. In this way, it advances our understanding of the extant variety of co-creation settings and their moderating role in configuring effective IP arrangements in co-creation, emphasizing thereby the value of building upon the contingency theory in this study. Our findings offer detailed insights about how different co-creation settings shape IP management to drive success of a company's co-creation endeavors, indicating that effective IP arrangements vary significantly in crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops.

8 | MANAGERIAL IMPLICATIONS

Our findings evoke solid practical implications for managing IP that may be useful for co-creation project managers in multiple ways.

We suggest applying configurational and contextual considerations when designing IP arrangements for co-creation projects. Namely, an effective IP arrangement is the one that embodies a configuration of multiple elements that are aligned both internally and externally to the given co-creation setting. Arranging IP in response to the specificities of a co-creation project may help

companies to meet the expectations of all parties involved and drive the co-creation towards the goals of the project. Inappropriate combination of IP control, compensation, NDAs, additional agreements, and the waiver option, or inappropriate inclusion or exclusion of one or more elements, may lead to low outcome quality, stakeholder dissatisfaction, and/or failure to comply with time and budget restraints, and on that basis, poor overall project performance.

Table 9 provides guidance for project managers as to how they may combine different IP-arrangement elements in a way that will generate high co-creation performance in specific settings. By manipulating these elements, project managers may adjust their IP arrangements to different co-creation projects they are running—crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops—and maximize their performance. Based on our findings, we recommend that managers may apply the following IP arrangements in the following co-creation settings: (1) crowdsourcing contests—IP arrangements based on monetary compensation and additional agreements; (2) virtual communities—IP arrangements based on NDAs complemented by low degree of IP control (option 1) or monetary compensation (option 2); (3) single expert sessions—IP arrangements based on NDAs complemented by high degree of IP control (option 1) or monetary compensation (option 2); and, (4) lead user workshops—IP arrangements based on NDAs, a low degree of IP control and additional agreements (option 1), or NDAs, a high degree of IP control and the waiver option (option 2), or NDAs and monetary compensation (option 3).

Our findings provide project managers with a choice of different IP arrangements not only across co-creation settings, but also within a single setting. Effective IP arrangements presented in Table 9 embody practical insights for co-creation project managers, highlighting the importance of specific configurational elements that should be taken into account, as well as those that ought to be excluded, to ensure project success. Due to a strong focus on the degree of IP control employed, multiple elements may be frequently neglected or overlooked, when developing their IP arrangements in particular co-creation settings. As emphasized in the words of the *OIconsult* project manager during our exploratory interview: "*If it would be only up to them [the client companies], they would protect as much as they could, but to get the most of it [co-creation], you need to be a little more open*." In this way, our findings provide guidance for managers about how to develop new, or alter and modify their current, IP arrangements in a way that will help them balance between IP protection and openness, and thereby respond effectively to specific contextual contingencies.

By creating a better understanding of the moderating role that different co-creation settings may have on the design of effective IP arrangements, as well as what combinations of elements create the basis for those arrangements, our findings and recommendations may serve as pillar for practitioner training on IP management in co-creation that has often been neglected by organizations practicing co-creation. Design of IP arrangements has been typically the sole responsibility of lawyers and legal departments, who want to ensure the best possible legal protection, without considering how specific rules and regulations affect the success of co-creation projects. Increased awareness and knowledge of the effective IP arrangements across the variety of co-creation settings may help managers create new or adjust existing IP arrangements to ensure successful co-creation outcomes.

Finally, this study has practical implications not only for companies initiating co-creation projects, but also for intermediaries that provide support for their clients in co-creation. Cognizant of the multidimensional and context-dependent character of effective IP management in co-creation, an intermediary company may propose to its client alternative IP arrangements that fit a specific co-creation setting.

9 | LIMITATIONS AND FUTURE RESEARCH

Even though they do not affect the rigor of our research, there are certain limitations of this study that are worth mentioning, as they may inspire future research in this area.

In its articulation of co-creation settings, this study considered crowdsourcing contests, virtual communities, single expert sessions, and lead user workshops, distinguished in terms of two pertinent factors, namely the nature of the co-creation medium (online vs. offline) and the morphology of co-creation engagement (company-to-one vs. company-to-many). Such an approach has its limitations, as it excludes other potentially relevant contextual factors, such as stage of the product life cycle, stage of the product innovation process, the type and degree of innovation, or even the industry sector (Alexy et al., 2009; Lakhani & Panetta, 2007; Mazzola et al., 2018; Zobel et al., 2017). However, the specific co-creation settings were adopted here drawing upon established insights from the literature (e.g., Felin & Zenger, 2014; Tekic & Willoughby, 2020) which point to varying contextual conditions prevailing across these settings that may influence the effectiveness of an IP arrangement in co-creation.

Additionally, employment of fsQCA as a data analysis technique restricts the number of configurational

elements that may be simultaneously analyzed, because of the exponential growth of the number of possible configurations as the number of elements increases. Thus, this research is limited to the analysis of the five IP-arrangement elements that determine how companies manage IP related to outcomes of co-creation projects, namely, IP control, compensation, NDAs, additional agreements, and the waiver option. Future research may benefit from extending the scope of analysis to the issues of managing the IP related to the inputs to co-creation projects.

In addition to co-creation settings and the configurational elements of IP arrangements, the third core component of this study was project performance, which was analyzed for the purpose of identifying effective IP arrangements across a variety of co-creation settings. However, since the measurement of project performance was based on the subjective assessment of projects by the projects' managers, it is potentially affected by managerial bias. This limitation may be overcome in future research by introducing more rigorous or extensive performance measures, such as the number of co-creators involved in a co-creation project or the number of co-creation inputs/outcomes, and so on. Nevertheless, as these additional performance measures differ across co-creation settings, such future studies would need to focus exclusively on a single setting.

Furthermore, bearing in mind that this study was based on a sample of co-creation projects from a single intermediary company, future research may benefit from examining IP arrangements adopted in co-creation projects run directly by the initiating companies or by a variety of intermediary companies. Nevertheless, this limitation does not significantly influence the generalizability of the research insights, as the final sample embraces a substantial variety of co-creation projects initiated by great variety of companies, from a diversity of industries. Additionally, even though the intermediary company offers the preliminary terms and conditions to the company starting a co-creation project, the final terms and conditions are decided by the legal department of each client company individually.

Finally, as companies may adopt different IP arrangements to ensure success of their projects, not only across co-creation settings, but also within a single setting, future research may aim to determine what the drivers might be for alternative choices, for example, organizational policy, some other project-specific characteristics, or different strategic intent (e.g., IP as a defensive mechanism or IP as a commercialization mechanism). These issues are beyond the scope of the present study which empirically investigated the influence of distinctive IP arrangements on the performance of co-creation projects within and across specific co-creation settings.

10 | CONCLUSION

Our insights about effective IP arrangements within and across a variety of co-creation settings contribute significantly to the emerging debate on IP management in co-creation between companies and individual external contributors. Revealing that companies deal intensively with IP management in co-creation, our study accords with the branch of open innovation research emphasizing the importance of effective management of IP in collaboration with third parties (e.g., Chesbrough & Chen, 2013; Granstrand & Holgersson, 2014; Hagedoorn & Zobel, 2015; Pisano & Teece, 2007), and contrasts with the branch of research emphasizing the idea that too much attention to IP may only impede open and collaborative innovation (e.g., Baldwin & von Hippel, 2011; Benkler, 2016; Nagle, 2018; von Hippel & von Krogh, 2003).

Finally, it is very important to note that an effective IP arrangement is not a sufficient condition for success of a co-creation project. There are many other components that constitute parts of the puzzle. However, an effective IP arrangement is certainly a necessary condition for success in co-creation, because there is no successful co-creation project if a company fails to manage the co-created IP.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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