Houston, we have a problem: Ambiguity in perceiving ‘open innovation’ by academia, business, and policy-makers

Albats Ekaterina, Podmetina Daria

‘Houston, we have a problem: ambiguity in perceiving ‘open innovation’ by academia, business and policy-makers’

Ekaterina Albats*,
Stanford University, Graduate School of Education, Scandinavian Consortium for Organizational Research (SCANCOR), 520 Galvez Mall, CERAS 123, Stanford, California 94305-3084, USA;
LUT University, School of Business and Management,
Yliopistonkatu 34, 53850, Lappeenranta, Finland.
E-mail: ealbats@stanford.edu
ORCID: 0000-0002-8041-8022

D. Sc. (Tech.) Ekaterina Albats is a postdoctoral research fellow at Stanford University, SCANCOR, Graduate School of Education, USA, also affiliated at LUT University, School of Business and Management, Finland. Ekaterina is specialized in the fields of innovation and technology management, open innovation and university-industry collaboration. Ekaterina has been working in multiple research projects on open innovation and business development, knowledge transfer, published her research results in multiple academic journals and books.

Daria Podmetina
LUT University, School of Engineering Science,
Yliopistonkatu 34, 53850, Lappeenranta, Finland.
E-mail: daria.podmetina@lut.fi
ORCID: 0000-0002-2525-5726

D. Sc. (Tech.) Daria Podmetina is an associate professor at LUT University, School of Engineering Science, Finland. Daria’s research focus is on innovation management, international business, open and collaborative innovation, sustainability and emerging markets, as reflected in her publications in academic journals. In addition, Daria has been working in number of university-industry and academic projects on innovative teaching methods in innovation and sustainability, integrating arts into STEM education, open innovation and others.

*Corresponding author

Abstract

The concept of 'open innovation' introduced back in 2003 has received a remarkable, somewhat viral popularity. It got spread way beyond academic circles and has been widely adopted by business practitioners as well as policymakers. However, as any young concept it still goes through the processes of theorizing, probing, and stretching its boundaries. As a result, the perceptions of what open innovation is varies not only between academic, business, and policymaking communities, but also within those. How does the open innovation concept manage its multi-lingual job of speaking to so diverse stakeholder and organizational groups? To find that out we rely on the literatures that tackle open innovation, on companies and policy-making organizations describing their open innovation strategies at their websites as well on primary survey data among companies on open innovation practices and perception. We identify and show where the perceptions differ, which open innovation practices perceived as such by the literature are commonly counted the same by companies and policymakers, what novel practices the groups suggest and what do we need to build a comprehensive understanding of this developing phenomenon.

Keywords: open innovation, open innovation definition, perceptions, academia, business, policymakers

Introduction

Since its initial inception by Professor Chesbrough in 2003 the 'open innovation' (OI) concept has received remarkable popularity. It is seen in the constantly growing number of academic publications on the topic, in OI becoming an inherent element of the leading companies' strategies (Huston & Sakkab, 2006) and growing forums for scientific, business and policy-making advancement led by 'The World Open Innovation Conference'. However, as any 'trendy' and yet emerging notion, 'open innovation' is still going through conceptualization and operationalization, faces criticism, ambiguity and duality (Dahlander et al., 2021; Groen & Linton, 2010; Trott & Hartmann, 2009). Furthermore, as 'open innovation' is a term coined by a university professor for executives, it is called to speak to both worlds – academic and business. Moreover, open innovation has become a field for policymaking (Bogers et al., 2018) and thus, policy-makers are part of the OI discourse too. Does the OI concept cope well with such a difficult 'multilingual' job? – this chapter is to find out.

The original, 'academic' definition of OI reads as '*a paradigm that assumes that firms can and should use external ideas as well as internal ideas, and internal and external paths to market, as the firms look to advance their technology'* (Chesbrough, 2003, p. xxiv). This notion of external ideas used internally later evolved into an academic term of 'outside-in'/'inbound' OI. The opposite phenomenon, internal ideas used externally, has evolved conceptually into 'inside-out'/'outbound' OI (Chesbrough and Crowther, 2006; Gassmann and Enkel, 2004). Accordingly, the growing scientific community has identified more than a dozen of 'open innovation activities' each classified as either 'inbound' or 'outbound' in logic (Chesbrough & Brunswicker, 2014; Teplov et al., 2019). Chesbrough and Bogers defining OI in the later work (2014, p. 27) highlight its link with companies' business model: '*a distributed innovation process based on purposively managed knowledge flows across organizational boundaries, using pecuniary and non-pecuniary mechanisms in line with each organization's business model'*. This embeddedness of OI into the

nature of organizations and inter-organizational relations make it particularly critical to understand but simultaneously more difficult to disentangle from more well-known organizational practices.

Business community, in turn, inspired by the OI 'paradigm' took it in use and it went somewhat viral leaving a lot of room for interpretation and, thus, dispute[1]. Furthermore, relying on more than twenty years of experience and in line with research findings NineSigma '*Open innovation basics'* highlight the prevailing role of inbound OI over outbound in the business world (NineSigma, 2019). Whether practicing (or not) certain activities limits managers' perception of OI, our prior research results (Teplov et al., 2019) suggest that predominantly only 'inbound' OI activities (yet not all of them) are seen as 'open innovation' by practitioners, with only 'free revealing' being an exception for 'outbound' ones.

This chapter is written to not only stress the issue of ambiguity in perception towards OI by business and research communities or contribute the 'dispute' message, but to also point out which practices show a mismatch and whether practitioners and policymakers could enhance an academic definition of OI with their experiences. We follow the theoretical roots of OI (Vanhaverbeke & Cloodt, 2014), as well as a critique perceiving OI concept as 'an old wine in new bottles' (Trott & Hartmann, 2009) and explore the perceptions of various organizational groups.

What is this thing called 'open innovation'? – Academia, business, and policy-making perspectives

Given our exploratory goal of analyzing and comparing the perceptions of OI existing in academia, business, and policy-making communities, we first review the perspectives within each group, which also show some diversity.

Academic perspective towards OI and OI in science

The academic perspective towards open innovation has been shaping for decades before Henry Chesbrough introduced its first formal definition (2003) and has its roots in multiple theories of organization. The resource-based view (Barney, 1991; Barney et al., 2001) and knowledge-based view (Felin & Hesterly, 2007) pointed out the value and scarcity of organizational resources, which itself demands searching for alternative, external resources and knowledge. OI also has its roots linked to the transaction-cost theory, where interorganizational transactions are essential (Vanhaverbeke & Cloodt, 2014; Williamson, 1981). In the transaction-cost theory, organizations tend to minimize the transaction costs, may be inclined to opportunistic behavior and thus, fear of similar attitude from the partners. A relational view (Dyer & Singh, 1998), in turn, focuses on 'maximizing the transactional value' through picking partners with greater resource complementarity and optimal governance. OI paradigm, which embraces complementarity, reciprocity and trust-building (Abu El-Ella et al., 2016; Pullen et al., 2012; Simeth & Raffo, 2013) thus follows a *transaction value theory* approach (Vanhaverbeke & Cloodt, 2014).

In terms of the literature streams, OI paradigm is also rooted into several management science fields (Bogers et al., 2019; Dahlander et al., 2021; Vanhaverbeke & Cloodt, 2014). Those include strategy and business model literature (Chesbrough, 2007), as if OI takes place it is tightly

[1] As for June 2021 the page on 'Open innovation' in 'Wikipedia' states: 'The neutrality of this article is disputed. (May 2013)' (Wikipedia, 2020): https://en.wikipedia.org/wiki/Open_innovation#cite_note-schuttemarais2010-11

integrated with both. More recently, the OI philosophy has been actively engaged with the literature on ecosystems (Ferreira & Teixeira, 2019) and platform-based business models (Dahlander et al., 2021; Nambisan et al., 2018). These developments led to distinguishing between different levels in analyzing OI. Bogers et al. (2017) overview the levels where OI is seen, those include: intra-organizational (individual, team, project, functional area, business unit); organisational (organisation, strategy, business model); Extra-organizational (external stakeholders, communities); inter-organizational (alliances, network, ecosystem); industry, regional, innovation systems (industry, inter-industry, region, nation, citizens, public policy and society). Still, what specific organizational practices are perceived as OI?

The variety of OI practices discussed in academic research come from the existing innovation surveys, such as Community Innovation Survey (Ebersberger et al., 2012; Grimpe and Sofka, 2009; Spithoven et al., 2013 and others) and practices elaborated by researchers (Clausen et al., 2013; Hung & Chou, 2013; Remneland Wikhamn & Wikhamn, 2013; Theyel, 2013). The OI practices were first aggregated into inbound, outbound, and coupled groups (Chesbrough and Crowther, 2006; Dahlander and Gann, 2010; Gassmann and Enkel, 2004), and later classified into inbound-outbound-pecuniary-non-pecuniary matrix by Chesbrough and Brunswicker (2013). The list of these practices was used for our survey and can be seen in Appendix 1. Burhcharth et al. (2014) also developed a literature-based list of OI practices: inbound – using external sources to search for new trends or technology; purchasing external R&D, licenses, patents, knowhow; involving lead users; and outbound – participating in others' innovation projects, selling patents, licenses, knowhow; freely revealing innovation. Chesbrough and Brunswicker revised the list of OI practices in 2018 by introducing categories, which somewhat aggregate the previously defined practices into: multi-actor/ collaborative (communities and professional networks, firm-sponsored OI communities, informal networking); multi-actor/ transactional (OI intermediaries, innovation contests and tournaments); bilateral / collaborative (bilateral partnerships); and bilateral / transactional (bilateral contracts). The globalization and digitalisation of recent decades posed significant, "game-changing" challenges to organizations of all types worldwide, thus, we feel that it is time to revise our comprehension of OI practices in order to understand the meaning of OI process and specifically link those to the practical implementation across organizational boundaries of academia, business and policy-making communities.

Speaking of going beyond conceptualizing OI in solely corporate context, Beck et al. (2020, p. 4) define OI for the context of science (academia): '*a process of purposively enabling, initiating, and managing inbound, outbound, and coupled knowledge flows and (inter/ transdisciplinary) collaboration across organisational and disciplinary boundaries and along all stages of the scientific research process, from the formulation of research questions and the obtainment of funding or development of methods (i.e. conceptualisation) to data collection, data processing, and data analyses (exploration and/or testing) and the dissemination of results through writing, translation into innovation, or other forms of codifying scientific insight (i.e. documentation)'.* As we can see, although the context differs from corporate, the principles of multi-directional knowledge flows across the entire cycle of the research process remains. The OI practices in science context according to Beck et al. (2020) could be grouped by the stakeholders involved, e.g. solely academics collaborating in cross-disciplinary projects (Gibbons et al., 1994) or involved in and open publishing (Maxwell et al., 2019); general public involved in citizen science or crowd

science (Franzoni & Sauermann, 2014). Industry actors may also be co-creators in the scientific research with universities spinning out the research, running contract research, consulting, and staff mobility with companies (Perkmann et al., 2013; Perkmann & Walsh, 2007) as well as establishing strategic partnerships with firms (Albats et al., 2020).

Business perspective towards OI

Instead of sourcing business perspective on OI from the literature, we turn to the actual companies' voices – their websites and the websites of their partners – to grasp the variety of perceptions existing in the business community.

In our prior work on OI conceptualization, we found that in business mindset, inbound OI practices dominate (Teplov et al., 2019). While browsing through corporate definitions in the internet, we see the same tendency remaining. For example, one of the FMCG giants, Unilever, on its 'open innovation' webpage is rather encouraging externals to meet Unilever challenges: "*…If you have a new design or technology that could help us grow our business and solve the challenges we've set, we'd like to work with you through Open Innovation…"*[2] The legendary "Connect + Develop" program of another FMCG giant, P&G (Huston & Sakkab, 2006) keeps embracing collaboration: "*Our external partnership program, Connect + Develop, is based on the belief that collaboration accelerates innovation… Our global team searches for trailblazers outside the company. Then, we create and nurture partnerships with these inventors, patent holders and other innovators—ultimately leading to new solutions in every area of business, from supply chains to products and technologies to in-store and e-commerce experiences."*. P&G' Signal program, in turn, introduced in 2012 promotes outbound OI: "*Since 2012, we have produced Signal P&G, a remarkable "inside out" conference that welcomes the world's most innovative business leaders into the company's headquarters in Cincinnati..."* [3]

Working on this chapter during the global COVID-19 pandemic, we could not neglect the view of big pharma. One of the vaccine-developing pioneers, AstraZeneca, when communicating their OI strategy, stresses the importance of sharing knowledge and resources across stakeholder groups for solving global challenges: "*AstraZeneca has spent decades creating unique enabling tools and technologies of interest to the scientific community of investigators… At the same time, academic, research foundation and biotech investigators have been developing insights, tools, technologies, platforms, resources and facilities that complement those of AstraZeneca… By bringing all of this together through partnering, we can test hypotheses that may otherwise not be possible. Sharing ideas and enabling scientific innovation to cross boundaries between academia, industry, government and non-profit organisations will help us translate innovative ideas into scientific breakthroughs and potential new medicines more quickly and effectively."*.[4]

LEGO in their FORMA program continuously engages adults and their non-traditional partners through crowdfunding website Indiegogo to create something different from what they usually

[2] See www.unilever.com/brands/innovation/open-innovation/

[3] See www.us.pg.com/innovation/

[4] See www.openinnovation.astrazeneca.com/

do[5]. IBM among others puts stakes on open source[6]. OI intermediaries (as InnoCentive, Qmarkets), as well as traditional businesses (as General Electric) continue to develop digital platforms and software for matchmaking, connecting and supporting OI partners[7]. All these diverse examples refer to OI, but focus on different OI practices and aspects, while mostly staying at organizational, extra-organizational or interorganizational levels (Bogers et al., 2017). The following policy-making perspective would help us climb higher in levels.

Policy-making perspective towards OI

OI paradigm has also received a wide recognition on a policy-making level. Governments of countries and regions apply OI principles to policy-making initiatives. Policymakers, as expected, are inclined to take an overarching perspective towards OI, oversee all the OI actors and support them in a targeted way. Governmental bodies support open collective actions with funding (Gläser & Laudel, 2016), establishing policy labs where various stakeholder groups run scientific foresight activities – e.g. IdeaLab in Denmark, Sitra in Finland, and the EU Policy Lab of the European Commission (Beck et al., 2020). Furthermore, state supports OI via developing regulations for the best social impact (Bogers et al., 2018; Robaczewska et al., 2019). One of the examples on regulations related to OI, are the ongoing policy-making efforts in regulating platform-based business and user data usage – as the more open and accessible the user data are, the more businesses leverage that user data the more privacy issues arise especially in non-regulated settings (Cusumano et al., 2019; Dahlander et al., 2021).[8].

Among the examples of OI definitions in the policy-making space, the EU-based initiative "Open Innovation 2.0" says: "*Open Innovation 2.0 is a new paradigm based on a Quadruple Helix Model where government, industry, academia and civil participants work together to co-create the future and drive structural changes far beyond the scope of what any one organization or person could do alone. This model encompasses also user-oriented innovation models to take full advantage of ideas' cross-fertilisation leading to experimentation and prototyping in real world setting."*[9]. This definition clearly implies coupled OI practices. We observe the perception of OI varies not only across the groups as business, academia, and government, but also within the groups. The U.S. Government Accountability Office, for example, shares mostly organizational-level and rather inbound view of OI on their website: "*Open innovation uses activities and technologies to harness the ideas, expertise, and resources of those outside an organization to address an issue or achieve specific goals."*[10]. Notably, these abovementioned definitions do not contradict each other, they rather emphasise different "faces" of OI. Such conceptual ambiguity is a very natural step in theoretical development and conceptualization of such a developing OI phenomenon (Teplov et al., 2019). Those might still create confusions and misinterpretations both between the groups of academia, business, government and within each of those. Our study is to help the views' alignment process take its steps forward.

---

[5] See www.lego.com/en-us/service/help/products/themes-sets/lego-forma/about-lego-forma-408100000016059

[6] See www.ibm.com/opensource/innovation/

[7] For examples see

[8] Examples of those policy-making efforts are GDPR policy in the EU, a package of acts in the US, as well as the efforts of non-profits like MyData.org. See www.mydata.org/about/

[9] See www.ec.europa.eu/digital-single-market/en/open-innovation-20

[10] See www.gao.gov/open-innovation

Research approach

Given an exploratory goal of our research, this study applies predominantly qualitative research strategy, with some of the data being quantified. In the analysis we used quantitative and qualitative data collected as a part of the OI-Net project[11] with a large-scale survey on OI practices, capabilities, and industrial needs for OI skills and abilities conducted in 2014-2015.

In total, 525 (N=525) responses from 38 countries were collected. Most of the sample are large companies with 250 employees and more (44.17%), while micro companies with less than ten employees are least represented.
The major quantitative variables taken for our analysis are (1) 1-7 Likert scale intensity of adopting each of the specific OI practices – 13 OI practices as per Chesbrough and Brunswicker (2013); and (2) "OI status", which implies six stages of generally OI adoption (Appendix 1). To avoid pitfalls associated with self-reported data and minimize risk of common method bias we adjusted the design of the questionnaire in such manner that respondents could not associate the question related to OI practices adoption and question on OI status. Of qualitative variables, the respondents were asked "*How do you define open innovation? Please provide your own definition (optional)*", although in the cover letter the respondents were provided with the definition of OI by Chesbrough (2003, p. 43). Among multiple control variables there are respondent' position and experience at the company, their company' country, company size, and others. All applied variables are allocated into Appendix 1.

Driven by our exploratory goals we started the analysis from looking at the definitions of OI provided by our respondents. All together 188 respondents (out of 525) replied to the OI definition question, after removing 7 responses containing irrelevant text, we analysed 181 definitions. First, two researchers independently analysed the OI definitions and then compared their analyses. We compared the definitions with the established definition of OI provided by Chesbrough and Bogers (2014) and identified the following categories coded qualitatively and quantitatively: inbound / outbound directions of OI definition; pecuniary / non-pecuniary aspects; OI practices associated with the definitions; additional practices proposed; aspects different from the traditional definition; keywords; level of relevance and novelty; level of analysis spotted in the definition. In terms of the OI definition relevance and novelty, we assessed the definitions by comparing those to the widely accepted definition by Chesbrough and Bogers (2014, p. 27), and identified whether the respondent' definition shared the logic with this classical, 'book' definition, adds any novelty or goes to a completely different direction in its logic. Furthermore, we checked if the definitions shared by the respondents explicitly refer to any specific OI practice (Appendix 1 based on Chesbrough and Brunswicker, 2013). In addition to qualitative analysis, the data was quantified and analysed in SPSS.

As the definitions were provided by individual respondents, we treat each of those as individual perspective, not as their organization perspective. Accordingly, we also analyzed the positions of the respondents and coded them into eight categories (Table 1). The majority of our respondents

[11] The data behind this chapter were collected by the European Academic Network for Open Innovation (OI-Net project), which received funding from the European Union Lifelong Learning Programme under the Grant Agreement Number 2013- 3830 (for more information please visit www.oi-net.eu).

are top managers, managers in different fields and leaders of R&D/innovation management departments working in companies for more than 10 years. Now, let's move towards analyzing their perceptions of OI.

[INSERT TABLE 1 HERE]

Research results

Practitioners defining open innovation versus theory-based practices

Aiming at understanding how the relevance and novelty of OI definition provided by our respondents (Variable 14 in Appendix 1) is explained by the factual adoption of OI in the company, we compared the definitions' relevance with OI adoption intensity (Var 9, Appendix 1) and OI Status (Var2, Appendix 1). The majority (117 / 181) of respondents tend to define open innovation very closely to the classical Chesbrough (2003, 2006)' definition (see Table 2). These respondents represent mostly companies with higher than average OI adoption intensity positioned on early to medium stage of OI adoption. 30 respondents gave a definition of OI, which is far from Chesbrough (2003, 2006)' definition. They reported lower than average adoption intensity but many of them identified OI status of company as 4 – "We are in the process of refining OI activities to help establish best practices in OI". This may indicate that these respondents interpret OI concept far differently than Chesbrough' school of thought and perceive their company' OI strategy in their own specific way. Furthermore, four respondents defined OI as activities as the ones focused exclusively on internal openness, however, the OI adoption level reported is above average. Six respondents provided definitions that follow Chesbrough's logic but add novel ideas and practices into it. However half of them stated that "we are not adopting and not planning to adopt open innovation". Very interesting category identified by us are the respondents who gave a rather traditional definition but add some novelty (24). 25 % of them do not adopt OI and don't plan, but the rest reported some of OI adoption. Let's first look at a few illustrative examples of the definitions that are 'close-to-the-book' and the ones which sound far from Chesbrough' logic.

[INSERT TABLE 2 HERE]

Two examples of 'close-to-the-book' definitions follow. The first one reads like: "*Open innovation means to me the use of others and to share our innovative knowledge. As a supplier of machines and systems we use innovative components in the end product. We share those products with our customers. We make use of students and universities to find out together about new technologies, solutions and ideas. Sharing innovations is done via students and universities and by delivering solutions to the end user of equipment."* (Coordinator of Technical training/HR, Industrials, The Netherlands; OI status 3: Early stages of implementing OI activities). The second example says: "*Not all good ideas are developed within the own company, and not all ideas should necessarily be further developed within the own firm's boundaries*." (Position: n/a, Latvia, Materials, OI status 3: Early stages of implementing OI activities). Those clearly reflect the boundary crossing nature and inbound and outbound dimensions of OI identified by the literature (Henry Chesbrough & Bogers, 2014; Gassmann & Enkel, 2004).

Among the respondents, who see OI as a predominantly internal practice, a good illustrative example of a definition would be: '*Open innovation - an excellent approach for encouraging employees to create new products and services*' (Top manager, strategic development, Slovenia, Industrials, OI status 5: Experienced adopters of OI). Here, the logic of sourcing ideas is present, but there is no emphasis on crossing organizational boundaries. Of the definitions, that go far from Chesbrough's tradition, Table 3 provides a few examples. As we can see, those come from managers of different levels and functional areas, countries, companies of different size having various level of OI adoption as per the respondents themselves assessing it.

[INSERT TABLE 3 HERE]

If we go deeper in the comparison of OI definitions (Var14, Appendix 1) and real adoption of OI practices in companies (Var1, Appendix 1), we see that not all OI practices find their reflection in the definitions shared by the respondents in our sample (only practices 1-4, 7,9,11-13, see Table 4 and appendix 1 for respective practices). Respondents providing the definitions that are different from the book, report that their companies adopt OI practices rather intensively, especially '*Scanning for external ideas*' and '*Collaborative innovation with external partners*'. Respondents, who see open innovation as predominantly internal practice report most of the 'book-based' OI practices adopted intensively (especially practices 1-4, 11,12, see appendix 1). Among the respondents, whose definition is close to the book or follows its logic and offers novelty, practices are overall adopted at a high level, with *'Scanning for external ideas', 'Collaborative innovation with external partners*' and *'Free Revealing (e.g. Ideas, IP) to external parties'* adopted at above average intensity.

[INSERT TABLE 4 HERE]

Definitions and respondents' positions

To enhance our understanding of the OI definitions offered by our respondents (Var14, Appendix 1) we turn to our unit of analysis – individual employees at surveyed organizations, as whatever they share is their individual perception. Referring to the general approach to sampling and respondents (see methodology part), we coded the position of the respondents (Var18, Appendix 1). We found that most of our respondents are top managers, managers, R&D and innovation managers (Table 5). Majority of R&D and Innovation managers (22/25) gave definitions which are very close to Chesbrough' tradition or proposed some novelty. Top managers (47/69) and other managers also stick to the traditional definition. Some novelty was mostly proposed by R&D and innovation managers as well as top managers, and radical innovative approach is rather rare and is mostly seen among managers and top managers (Table 5).

[INSERT TABLE 5 HERE]

Definitions and specific OI practices

Qualitative analysis of OI definitions revealed that a number of those refer to specific OI practice(s), which we coded (Var10, Appendix 1) according to the list of OI practices in the quantitative survey (Var1, Appendix 1). We also specified if "none" of the practices were

specifically mentioned in the definition (in 38 definitions we were unable to identify any OI practice) as well as if the definition is rather "generic" referring not to a specific practice but to rather general logic of a 'book' OI definition (15 / 181) – see Table 6. An example of only a single OI practice taken into consideration: *"The involvement of consumers in product development process, allowing for more efficient understanding of their needs, taking that into account (immediate feedback). Using a user can directly take advantage of their knowledge and creativity in connection with the products."* (Head of business development, Industrials, Hungary, OI status 2: We are not currently adopting open innovation, but plan to implement OI in the nearest future). The 'generic' examples, which rather refer to an attitudinal aspect of OI include: "*Openness to external technologies and techniques and the level of their respect*" (Junior developer, Energy, Croatia, OI status 3: Early stages of implementing OI activities) and "*Open innovation is a creative lifestyle aimed at creating the material and spiritual values to future generations*." (Project Manager, Consulting, Latvia, OI status 3: Early stages of implementing OI activities).

[INSERT TABLE 6 HERE]

The OI practices most commonly referred in the OI definitions are: "Collaborative innovation with external partners (i.e. suppliers, universities, competitors)" (56/181), "Scouting for external ideas" (38/181) and "Free Revealing (e.g. Ideas, IP) to external parties" (12/181). Although we did spot some of the OI practices within the 'incorrect' definitions, these practices are either dominating the definition shared by a respondent or changing the overall definition logic. See for example, this definition, which positions open innovation as a predominantly 'free-revealing' practice: "*Open innovation must be all innovations, which are intended for the public good and helpful man and the environment.*" (Top manager, Slovenia, OI status – 2: We are not currently adopting open innovation, but plan to implement OI in the nearest future). Definitions with "some novelty" are mostly based on "Collaborative innovation with external partners" as OI practice (see Table 6).

[INSERT TABLE 7 HERE]

Going across levels and novel definitions proposed

Already at the stage of initial coding we noted that the respondents perceive OI differently also in terms of the analytical level (Table 8). Relying on Bogers et al. (2017) we coded the shared definitions as the ones referring to a single or few levels of the following: Intra-organizational (Individual Group/Team, Project, Functional area, Business unit); Organisational (Firm, Other (non-firm), organisation, Strategy, Business model); Extra-organizational (External stakeholders, Individual, Community, Organisation); Inter-organizational (Alliances, Network, Ecosystem); Industry, regional, innovation systems (Industry development, Inter-industry differences, Local region, Nation, Supra-national institution, Citizens, Public policy and society) (Var17, Appendix 1). Most of the definitions in our sample refer to either extra-organizational level of external stakeholders or to the inter-organizational level of collaborative projects (see Table 8). Let's look at a few examples of how we distinguished between different levels in the definitions.

[INSERT TABLE 8 HERE]

We saw the intra-organizational level focus in the definitions where open innovation is perceived as an attitude, a mindset, or an intra-organizational aspect is highlighted. For example: "*Open innovation - a mind set for new creations open to all possibilities and risks*" or "*Internal independent department innovating together with needed external partners by following customer needs to find out which innovations would be in need*". The first definition mentions a mindset, which could be an individual or an intra-organizational, while the second example mentions an intra-organizational department. Obviously, both examples also refer to the other levels: the first one refers to organizational, strategy level mentioning the openness to externals, while the second one clearly refers to extra-organizational level and mentions specific external partners. So, these definitions were coded accordingly as having multiple levels referred. The highest, policy level, just like intra-organizational level was referred by only a minority of our respondents, but one of the prominent examples of a public policy level reads as: "*Many government programmes such as the one my organization is administrating ("ForskEL") can partly be considered to be open innovation. Basically, it invites new ideas and concepts on renewable energy to be screened by a board of experts. If accepted, the concept or idea will be sponsored by the programme but applying to conditions on sharing knowledge obtained. If multiple actors manage to promote a joint concept this is an advantage as the programme encourages joint efforts among participating companies."* As we can see this Danish program aims to go beyond even inter-organizational level as supports those administratively and financially as an umbrella program.

We close our analysis with a few examples of the novel definitions or particularly, novel OI practices proposed. One group of these "new additions" (Table 9) are the definitions, which refer to open innovation as innovation available for everyone (for free), innovation for the public good and society. Several definitions refer to sustainability aspects in a similar attitude of 'innovation for everyone. Notably, this 'innovation for everyone' and mostly non-pecuniary tone is heard predominantly from the top management group in our sample with the OI status varying from low to high.

[INSERT TABLE 9 HERE]

Another mention of specific practices close to 'innovation for everyone' is 'open source' and 'loose patents', but as we all know, those are strategic practices, which are done with not just altruistic motives (Dahlander et al., 2021; Wang & Peng, 2020). One more idea of OI practice shared by our respondents is perceiving OI as a certain environment, being not material, but spiritual space for ideas and knowledge exchange, which may take a form of a virtual platform. This is an example, which indeed is not very easy to touch, codify and maybe add to the list of 'standard' OI practices, but as we already passed the platform revolution age (Parker et al., 2016) and the power of network effects is widely acknowledged (Evans & Gawer, 2016), this stream of practices deserves a separate mention. Expert mentoring is also standing out as a practice that helps to spark internal innovation as well as achieve synergy in innovating with others. Finally, as a fly in the ointment, there is a mention of OI perceived as 'putting money into laziness', where if we

interpret our respondent correctly, engaging others for resources reflects laziness. If we speculate further, such an approach may lead to the 'not-invented-here' syndrome (Burcharth et al., 2014), when getting an external help is perceived as inappropriate or 'lazy' approach.

Practical applications

Following the most recent theoretical insights (Bhattacharyya & Thakre, 2021; Dahlander et al., 2021; Greco, 2021; Valdez-Juárez & Castillo-Vergara, 2021) and empirical findings we identified several dimensions where tensions in perceiving OI are spotted. The major dimensions of tensions include transdisciplinary of the OI phenomenon, perspectives varying in levels, novel OI practices getting saturation in business context but not yet in theory, and synergy between these dimensions.

Open Innovation goes beyond borders again: towards trans-disciplinarity – OI is everywhere!

Since its introduction in 2003 OI concept has been mostly business-oriented and heavily relied on various literature streams. Being tightly related to established theories as relational view, OI has been heavily criticised for being "old wine in new bottles" (Trott & Hartmann, 2009). At the same time, globalization, climate change and digitalization intensified in the past decades have generally enhanced the embeddedness and interconnectedness of such phenomena (and literature on those) as corporate social responsibility, sustainability, circular economy, green energy, platform-based economies, open innovation, big data, and ecosystems (Dahlander et al., 2021). This overlapping of trends somehow smudges the borders between concepts, ensure the mutual saturation and increase the transdisciplinary of a wide spectrum of organizational practices. We found that open innovation is not an exception, and it is rather a mix of "old and new wines", the "taste" or perception of which heavily depends not only on the environmental factors but also on who exactly is trying the "wine".

Knowledge transformation and theory development – Big data eats OI for breakfast!

Nowadays, with the emergence and power of big data and platform-based businesses, both new opportunities and challenges emerge (Del Vecchio et al., 2018; Nambisan et al., 2018). Managing big data is less linear than classical inbound and outbound OI practices. "*The data economy pushes us to consider competitive dimensions of open innovation where data may not be freely available and where the interests of multiple players must be considered simultaneously*." (Dahlander et al., 2020, p.4). Furthermore, social and legal responsibilities of multiple big data players demand an agile balance in open value creation and capture (Saebi & Foss, 2015; Sjödin et al., 2020). Thus, it becomes more and more problematic to perceive OI in isolation and solely through the lens of pecuniary logic.

From organizational through ecosystem towards policy-making – OI is embedding!

Following the big data spread, in their recent paper Dahlander et al. (2021, p.4) stated that " *…open innovation researchers should consider the wider picture. Research has often focused on the use of open innovation from one target firm's perspective. But as data is growing in importance and*

the practice of open innovation becomes ubiquitous, inherent trade-offs are revealed and need to be addressed. These concerns clearly connect open innovation to the growing field of ecosystems". Thus, and in line with some of our respondents' opinions, OI could not and should not be perceived solely from a single organization viewpoint, as every organization is not just a stand-alone player, which could opportunistically and irresponsibly rely on others (e.g. trade user data in absence of regulations for that), but is a player in an ecosystem and in society, now more than ever, where the actors are increasingly interdependent and are watched more and more for their sustainable practices, social contribution or harm (Bhattacharyya & Thakre, 2021; Radziwon & Bogers, 2019; Vasudeva et al., 2020). Data trading and platform-based businesses are no more irregulated fields (Cusumano et al., 2019; Yun et al., 2020), environmental innovations at organizations tend to heavily depend on both – the behaviour of their ecosystem actors as well as governmental measures to support changes for sustainable future.

Emergence of novel OI practices: something old, something new, something borrowed and something blue

The understanding and practical implementation of OI by management community went beyond traditional Chesbrough definition (2003, 2006) and novel OI practices emerged while OI has been penetrating multiple organizational types and levels. For example, citizen science, where public is directly involved in scientific research (Sauermann et al., 2020) is called to democratize science, make it more open as well as help to achieve sustainable development goals. Indeed, the literature on social innovation suggests us that the best innovators are citizens who "spot needs which aren't being adequately met by the market or the state" (Mulgan, 2006, p. 150). Patent "open-source" strategy is becoming more and more visible beyond computer-based businesses with Tesla that offered a "good faith" patent pledge being a prominent example (Dahlander et al., 2021; Wang & Peng, 2020). Tesla case, however, also demonstrates how revealing of internal technology to potential partners could have indirect effects and be an instrument for fighting the competitive sector, traditional automotive one for Tesla (Dahlander et al., 2021). The general corporate interest in open-source platforms (GitHub, Red Hat, Linux) indirectly shows the hidden power of an open source practice, while triggers a question of 'how open the commons will remain?' (Dahlander et al., 2021). Generally, the increased usage of platforms and software for managing and exchanging knowledge deserves consideration as a separate OI practice.

Synergy of OI

Similarly to Weber and Rohracher (2012) we argue that a multi-level research approach is needed to study OI and boost transformational changes. A recent event demanding such changes and collaboration, is the global COVID-19 pandemic. A single theoretical stream is not enough to comprehend so complex phenomenon and the role of OI in it (Bhattacharyya & Thakre, 2021). Even a 'system'-type of approach is apparently not enough to grasp the essence of complex transformational processes in relations of businesses, academia, policy-making institutions and society (Weber & Rohracher, 2012). Accordingly, a further revision of OI definition would call for a more comprehensive and inclusive approach. That first implies an inclusion of all the relevant levels at which OI could be analysed (Bogers et al., 2017). Second, such a future definition would admit and highlight the interconnectedness of OI with day-to-day organizational operations and inter-organizational relations. More of theorization efforts are needed for OI: as fashion and

strategy it works, but practices and recommendations are blurry, perceptions are ambiguous, instruments are taken from other theories (relational view, strategy, etc.) and own measurement instruments are underdeveloped.

We want to conclude with the following chain of thoughts shared with us recently in a conversation by a technology transfer expert: *"Open innovation is now often very misunderstood. Most people using the term "open innovation" have not actually read the books about open innovation and are therefore not familiar [with] the different concepts thereof. They wouldn't know that there [is] a quite different number of flavors,… and that open innovation, first of all, doesn't mean that results are owned by everybody. Reasons that open innovation is not [enough] widespread… include that universities are not really trained to engage with open innovation projects and concepts yet, but companies aren't either. … Yeah, there are a few companies who have opened themselves to an open innovation concept very successfully, but a lot of the companies, and also really technical companies are unable (or unwilling?) to change themselves and implement open innovation concepts and practices yet."* (technology transfer expert, head of the university technology transfer office in Germany). As we can see, a dedicated training of multiple organizational and professional groups could become one of the practical steps towards improving understanding of OI between the groups and if not unify their perceptions (which is not an ultimate goal) allow them to speak and understand the OI languages of each other.

Conclusions (500 words) 262 words

Aim of our chapter is not to provide any strong claims on 'right' or 'wrong' perceptions of open innovation. It is rather about the need to perceive open innovation as a natural phenomenon, like a sunshine. It can be shining bright and reaching every corner – as open innovation penetrating organizational strategy, inter-organizational ecosystems, regions, and policymaking. The sun can be hidden behind the clouds but still providing the daylight – as specific open innovation practices being on hold in a certain organization, but still existing elsewhere and reaching out. It can also hit with sunburns – as when too much of openness could become harmful in terms of intellectual property leakages or data-related issues. Or, periods of polar day and night could be observed – as when the economic, business and social environment becomes more or less favorable to openness. Just like the sun, open innovation is an alive phenomenon, and we learn new things about it day by day.

In terms of our contribution and future research, this chapter is among a few works, which try to perceive open innovation critically, but still comprehensively and take into account the viewpoints of the diverse communities as business, academia and policymakers. Future research should probably work towards developing an overarching OI definition which would speak to different communities, so everyone could explain still in their own words what is open innovation but reach a deeper consensus than exists now. Furthermore, based on our findings, future research could develop and validate a revised list of open innovation practices for multiple organizational groups.

Acknowledgement

The data behind this chapter were collected by the European Academic Network for Open Innovation (OI-Net project), which received funding from the European Union Lifelong Learning Programme under the Grant Agreement Number 2013- 3830 (for more information please visit www.oi-net.eu).

References

Abu El-Ella, N., Bessant, J., & Pinkwart, A. (2016). Revisiting the Honorable Merchant: The Reshaped Role of Trust in Open Innovation. *Thunderbird International Business Review*, *58*(3). https://doi.org/10.1002/tie.21774

Albats, E., Bogers, M., & Podmetina, D. (2020). Companies' human capital for university partnerships: A micro-foundational perspective. *Technological Forecasting and Social Change*, *157*, 120085. https://doi.org/10.1016/j.techfore.2020.120085

Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. In *Journal of Management* (Vol. 17, Issue 1, pp. 99–120). https://doi.org/10.1177/014920639101700108

Barney, Jay, Wright, M., & Ketchen, D. J. (2001). The resource-based view of the firm: Ten years after 1991. *Journal of Management*, *27*(2001), 625–641.

Beck, S., Bergenholtz, C., Bogers, M., Brasseur, T. M., Conradsen, M. L., Di Marco, D., Distel, A. P., Dobusch, L., Dörler, D., Effert, A., Fecher, B., Filiou, D., Frederiksen, L., Gillier, T., Grimpe, C., Gruber, M., Haeussler, C., Heigl, F., Hoisl, K., … Xu, S. M. (2020). The Open Innovation in Science research field: a collaborative conceptualisation approach. *Industry and Innovation*, *00*(00), 1–50. https://doi.org/10.1080/13662716.2020.1792274

Bhattacharyya, S. S., & Thakre, S. (2021). Coronavirus pandemic and economic lockdown; study of strategic initiatives and tactical responses of firms. *International Journal of Organizational Analysis*. https://doi.org/10.1108/IJOA-05-2020-2198

Bogers, M., Chesbrough, H., Heaton, S., & Teece, D. J. (2019). Strategic Management of Open Innovation: A Dynamic Capabilities Perspective. *California Management Review*, *62*(1), 77–94. https://doi.org/10.1177/0008125619885150

Bogers, M., Chesbrough, H., & Moedas, C. (2018). Open innovation: Research, practices, and policies. *California Management Review*, *60*(2), 5–16. https://doi.org/10.1177/0008125617745086

Bogers, M., Zobel, A.-K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S., Hagedoorn, J., Hilgers, D., Laursen, K., Magnusson, M. G., Majchrzak, A., McCarthy, I. P., Moeslein, K. M., Nambisan, S., Piller, F. T., … Ter Wal, A. L. J. (2017). The open innovation research landscape: established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, *24*(1), 8–40. https://doi.org/10.1080/13662716.2016.1240068

Brunswicker, S., & Chesbrough, H. (2018). The Adoption of Open Innovation in Large Firms. *Research Technology Management*, *61*(1), 35–45. https://doi.org/10.1080/08956308.2018.1399022

Burcharth, A. L. D. A., Knudsen, M. P., & Søndergaard, H. A. (2014). Neither invented nor shared here: The impact and management of attitudes for the adoption of open innovation practices. *Technovation*, *34*(3), 149–161. https://doi.org/10.1016/j.technovation.2013.11.007

Chesbrough, H. (2003). Open Innovation The New Imperative for Creating and Profiting from Technology Xerox PARC The Achievements and Limits of Closed Innovation. *Harvard Business School Press*, 1–10. https://doi.org/10.1111/j.1467-8691.2008.00502.x

Chesbrough, H. (2006). *Open Innovation: The New Imperative for Creating and Profiting from Technology*. Harvard Business School Press. https://books.google.fi/books?id=OeLIH89YiMcC

Chesbrough, H., & Brunswicker, S. (2014). A Fad or a Phenomenon? The Adoption of Open Innovation Practices in Large Firms. *Research Technology Management*, *57*(2), p16-25. https://doi.org/10.5437/08956308X5702196

Chesbrough, Henry, & Bogers, M. (2014). Explicating Open Innovation: Clarifying an Emerging Paradigm for Understanding Innovation Keywords. *New Frontiers in Open Innovation*, 1–37. https://doi.org/10.1093/acprof

Chesbrough, Henry, & Brunswicker, S. (2013). *Managing open Innovation in Large firms. EXECUTIVE SURVEY ON OPEN INNOVATION 2013, FRAUNHOFER VERLAG*.

Chesbrough, Henry, & Crowther, A. K. (2006). Beyond high tech: Early adopters of open innovation in other industries. *R&D Management Management*, *36*(3), 229–236. https://doi.org/10.1111/j.1467-9310.2006.00428.x

Chesbrough, Henry W. (2007). Why companies should have Open Business Models? *MIT Sloan Management Review*, *48*(2), 22–28. https://doi.org/10.1111/j.1540-5885.2008.00309_1.x

Chesbrough, Henry William. (2003). *Open innovation: the new imperative for creating and profiting from technology*. Harvard Business School Press. http://ictlogy.net/bibliography/reports/projects.php?idp=2546

Chesbrough, Henry William., & Crowther, A. K. (2006). Beyond high-tech: early adopters of Open Innovation in other industries. *R&D Management*, *36*(3), 229–236. https://doi.org/10.1111/j.1467-9310.2006.00428.x

Clausen, T. H., Korneliussen, T., & Madsen, E. L. (2013). Modes of innovation, resources and their influence on product innovation: Empirical evidence from R&D active firms in Norway. *Technovation*, *33*(6–7), 225–233. https://doi.org/10.1016/j.technovation.2013.02.002

Cusumano, M. A., Gawer, A., & Yoffie, D. B. (2019). *The business of platforms: strategy in the*

age of digital competition, innovation, and power. NY: HarperCollins.

Dahlander, L., & Gann, D. M. (2010). How open is innovation? *Research Policy*, *39*(6), 699–709. https://doi.org/10.1016/j.respol.2010.01.013

Dahlander, L., Gann, D. M., & Wallin, M. W. (2021). How open is innovation? A retrospective and ideas forward. *Research Policy*, *50*(4), 104218. https://doi.org/10.1016/j.respol.2021.104218

Del Vecchio, P., Di Minin, A., Petruzzelli, A. M., Panniello, U., & Pirri, S. (2018). Big data for open innovation in SMEs and large corporations: Trends, opportunities, and challenges. *Creativity and Innovation Management*, *27*(1), 6–22. https://doi.org/10.1111/caim.12224

Dyer, J. H., & Singh, H. (1998). The Relational View : Cooperative Strategy and Sources of Interorganizational Competitive Advantage Author (s): Jeffrey H . Dyer and Harbir Singh Source : The Academy of Management Review , Vol . 23 , No . 4 (Oct ., 1998), pp . 660-679 Published by : *Academy of Management Review*, *23*(4), 660–679.

Ebersberger, B., Bloch, C., Herstad, S. J., & Van De Velde, E. L. S. (2012). Open innovation practices and their effect on innovation performance. *International Journal of Innovation and Technology Management*, *9*(6). https://doi.org/10.1142/S021987701250040X

Evans, P. C., & Gawer, A. (2016). The Rise of the Platform Enterprise A Global Survey. In *The Emerging Platform Economy Series* (Issue January).

Felin, T., & Hesterly, W. S. (2007). The knowledge-based view, nested heterogeneity, and new value creation: Philosophical considerations on the locus of knowledge. *The Academy of Management Review*, *32*(1), 195–218.

Ferreira, J. J., & Teixeira, A. A. C. (2019). Open innovation and knowledge for fostering business ecosystems. *Journal of Innovation and Knowledge*, *4*(4), 253–255. https://doi.org/10.1016/j.jik.2018.10.002

Franzoni, C., & Sauermann, H. (2014). Crowd science: The organization of scientific research in open collaborative projects. *Research Policy*, *43*(1), 1–20. https://doi.org/10.1016/j.respol.2013.07.005

Gassmann, O., & Enkel, E. (2004). Towards a theory of open innovation: three core process archetypes. *R&D Management Conference*, 1–18. https://doi.org/10.1.1.149.4843

Gibbons, M., Limoges, C., Nowotny, H., Schwartzmann, S., Scrott, P., & Trow, M. (1994). *The New Production of Knowledge: The Dynamics of Science and Research in Contemporary Societies.* Sage.

Gläser, J., & Laudel, G. (2016). Governing science: How science policy shapes research content. *European Journal of Sociology*, *15*(1), 117–168. https://doi.org/10.1017/s0003975616000047

Greco, M. (2021). *Intellectual capital and open innovation*.

Grimpe, C., & Sofka, W. (2009). Search patterns and absorptive capacity: Low- and high-technology sectors in European countries. *Research Policy*, *38*(3), 495–506. https://doi.org/10.1016/j.respol.2008.10.006

Groen, A. J., & Linton, J. D. (2010). Is open innovation a field of study or a communication barrier to theory development? *Technovation*, *30*(11), 554.

Hung, K. P., & Chou, C. (2013). The impact of open innovation on firm performance: The moderating effects of internal R&D and environmental turbulence. *Technovation*, *33*(10–11), 368–380. https://doi.org/10.1016/j.technovation.2013.06.006

Huston, L., & Sakkab, N. (2006). Connect and Develop Inside Procter & Gamble's New Model for Innovation. *Harvard Business Review*, *84*(3), 58–66.

Mulgan, G. (2006). The Process of Social Innovation. *Innovations: Technology, Governance, Globalization*, *1*(2), 145–162. https://doi.org/10.1162/itgg.2006.1.2.145

Nambisan, S., Siegel, D., & Kenney, M. (2018). On Open Innovation, Platforms, and Entrepreneurship. *Strategic Entrepreneurship Journal*, *12*(3). https://doi.org/10.1002/sej.1300

NineSigma. (2019). *Open Innovation Basics*. Open Innovation Basics. https://www.ninesigma.com/open-innovation-basics/

Parker, G. G., Van Alstyne, M. W., & Choudary, S. P. (2016). *Platform Revolution: How Networked Markets Are Transforming the Economy and How to Make Them Work for You*. W. W. Norton & Company.

Perkmann, M., Tartari, V., McKelvey, M., Autio, E., Broström, A., D'Este, P., Fini, R., Geuna, A., Grimaldi, R., Hughes, A., Krabel, S., Kitson, M., Llerena, P., Lissoni, F., Salter, A., & Sobrero, M. (2013). Academic engagement and commercialisation: A review of the literature on university-industry relations. *Research Policy*, *42*(2), 423–442. https://doi.org/10.1016/j.respol.2012.09.007

Perkmann, M., & Walsh, K. (2007). University-industry relationships and open innovation: Towards a research agenda. *International Journal of Management Reviews*, *9*(4), 259–280. https://doi.org/10.1111/j.1468-2370.2007.00225.x

Pullen, A. J. J., De Weerd-Nederhof, P. C., Groen, A. J., & Fisscher, O. A. M. (2012). Open innovation in practice: Goal complementarity and closed NPD networks to explain differences in innovation performance for SMEs in the medical devices sector. *Journal of Product Innovation Management*, *29*(6), 917–934. https://doi.org/10.1111/j.1540-5885.2012.00973.x

Radziwon, A., & Bogers, M. (2019). Open innovation in SMEs: Exploring inter-organizational relationships in an ecosystem. *Technological Forecasting and Social Change*, *146*(May 2018), 573–587. https://doi.org/10.1016/j.techfore.2018.04.021

Remneland Wikhamn, B., & Wikhamn, W. (2013). Structuring of the open innovation field.

Journal of Technology Management and Innovation, *8*(3), 173–185. https://doi.org/10.4067/s0718-27242013000400016

Robaczewska, J., Vanhaverbeke, W., & Lorenz, A. (2019). Applying open innovation strategies in the context of a regional innovation ecosystem: The case of Janssen Pharmaceuticals. *Global Transitions*, *1*, 120–131. https://doi.org/10.1016/j.glt.2019.05.001

Saebi, T., & Foss, N. J. (2015). Business models for open innovation: Matching heterogeneous open innovation strategies with business model dimensions. *European Management Journal*, *33*(3), 201–213. https://doi.org/10.1016/j.emj.2014.11.002

Sauermann, H., Vohland, K., Antoniou, V., Balázs, B., Göbel, C., Karatzas, K., Mooney, P., Perelló, J., Ponti, M., Samson, R., & Winter, S. (2020). Citizen science and sustainability transitions. *Research Policy*, *49*(5), 103978. https://doi.org/10.1016/j.respol.2020.103978

Simeth, M., & Raffo, J. D. (2013). What makes companies pursue an Open Science strategy? *Research Policy*, *42*(9), 1531–1543. https://doi.org/10.1016/j.respol.2013.05.007

Sjödin, D., Parida, V., Jovanovic, M., & Visnjic, I. (2020). Value Creation and Value Capture Alignment in Business Model Innovation: A Process View on Outcome-Based Business Models. *Journal of Product Innovation Management*, *37*(2), 158–183. https://doi.org/10.1111/jpim.12516

Spithoven, A., Vanhaverbeke, W., & Roijakkers, N. (2013). Open innovation practices in SMEs and large enterprises. *Small Business Economics*, *41*(3), 537–562. https://doi.org/10.1007/s11187-012-9453-9

Teplov, R., Albats, E., & Podmetina, D. (2019). What Does Open Innovation Mean? Business Versus Academic Perceptions. *International Journal of Innovation Management*, *23*(1). https://doi.org/10.1142/S1363919619500026

Theyel, N. (2013). Extending open innovation throughout the value chain by small and medium-sized manufacturers. *International Small Business Journal*, *31*(3), 256–274. https://doi.org/10.1177/0266242612458517

Trott, P., & Hartmann, D. (2009). Why "open innovation" is old wine in new bottles. *International Journal of Innovation Management*, *13*(4), 715–736. http://www.worldscinet.com/abstract?id=pii:S1363919609002509

Valdez-Juárez, L. E., & Castillo-Vergara, M. (2021). Technological capabilities, open innovation, and eco-innovation: Dynamic capabilities to increase corporate performance of smes. *Journal of Open Innovation: Technology, Market, and Complexity*, *7*(1), 1–19. https://doi.org/10.3390/joitmc7010008

Vanhaverbeke, W., & Cloodt, M. (2014). Theories of the Firm and Open Innovation. In Henry William Chesbrough, W. Vanhaverbeke, & J. West (Eds.), *New Frontiers in Open Innovation* (pp. 256–278). Oxford University Press.

Vasudeva, G., Leiponen, A., & Jones, S. (2020). Dear Enemy: The Dynamics of Conflict and

Cooperation in Open Innovation Ecosystems. *Strategic Management Review*, *1*(2), 355–379. https://doi.org/10.1561/111.00000008

W Maxwell, J., Hanson, E., Desai, L., Tiampo, C., O'Donnell, K., Ketheeswaran, A., Sun, M., Walter, E., & Michelle, E. (2019). Mind the Gap: A Landscape Analysis of Open Source Publishing Tools and Platforms. *Mind the Gap: A Landscape Analysis of Open Source Publishing Tools and Platforms*. https://doi.org/10.21428/6bc8b38c.2e2f6c3f

Wang, J., & Peng, X. (2020). A Study of Patent Open Source Strategies Based on Open Innovation: The Case of Tesla. *Open Journal of Social Sciences*, *08*(07), 386–394. https://doi.org/10.4236/jss.2020.87031

Weber, K. M., & Rohracher, H. (2012). Legitimizing research, technology and innovation policies for transformative change: Combining insights from innovation systems and multi-level perspective in a comprehensive "failures" framework. *Research Policy*, *41*(6), 1037–1047. https://doi.org/10.1016/j.respol.2011.10.015

Wikipedia. (2020). *Open innovation*. Open Innovation. https://en.wikipedia.org/wiki/Open_innovation#cite_note-schuttemarais2010-11

Williamson, O. E. (1981). The economics of organization: The transaction cost approach. *American Journal of Sociology*, *87*(3), 548–577.

Yun, J. H. J., Zhao, X., Wu, J., Yi, J. C., Park, K. B., & Jung, W. Y. (2020). Modelo de negócios, inovação aberta e sustentabilidade na indústria de compartilhamento de automóveis - comparando três economias. *Sustainability (Switzerland)*, *12*(6), 27. https://www.mdpi.com/journal/sustainability