



Uncovering value through exploration of barriers - A perspective on intellectual property rights in a national innovation system

Arho Suominen^{a,b,*}, Matthias Deschryvere^{b,d}, Romy Narayan^c

^a Department of Industrial Engineering and Management, Tampere University, Korkeakoulunkatu 8, PL 541, 33014, Tampereen yliopisto, Finland

^b VTT Technical Research Centre of Finland, Tekniikantie 21, P.O. Box 1000, 02044, Espoo, Finland

^c School of Management, Strategic Management, University of Vaasa, Tervahovi D303, Wolffintie 34, 65200, Vaasa, Finland

^d Jyväskylän University School of Business and Economics, P.O. Box 35, FI-40014, University of Jyväskylä, Jyväskylä, Finland

ARTICLE INFO

Keywords:

Intellectual property
National innovation system
Delphi study

ABSTRACT

Although for a long time policy has emphasized the role of intellectual property rights as a growth agent facilitating innovation, the literature has called into question this relationship. Critical studies have focused on studying policy frames and protection modes that could transform the intellectual property rights system to be more beneficial. Studies have not, however, focused on the intellectual property rights system stakeholders in cocreating the system. Our study contributes to the literature by uncovering the tensions in developing a national-level intellectual property rights strategy. Using the Delphi method, we draw from a broad stakeholder dialogue to show the barriers for intellectual property rights system development. Our results highlight that the development of intellectual property rights system is challenged by a lack of inclusiveness, matching capabilities, and high levels of disagreement among the stakeholders on development paths.

1. Introduction

Based on the common consensus regarding the role of knowledge and innovations in fostering economic prosperity (Romer, 1990; Lucas Jr, 1988; Acs et al., 2002) and that intellectual property rights (IPRs), particularly patents, have a significant role in facilitating innovation (Moser, 2013; Khan, 2005; Woo et al., 2015), innovation policy has been shown to emphasize the role of IPR as a growth agent. However, evidence emerging from an a growing stream of the literature, both theoretical and empirical, has shown that the role of IPRs as an incentive for innovation remain unclear (Goel and Saunoris, 2020; Sweet and Eterovic, 2019; Andersen and Konzelmann, 2008; Glass and Saggi, 2002; Grossman and Helpman, 1991; Cho et al., 2015; Boldrin and Levine, 2009; Dosi et al., 2006b; Helpman, 1992). The standard justification for IPRs fixing "market failures" in knowledge generation has not held up either (Dosi et al., 2006a). Assumptions that the interactions of micro-level units (e.g., firms and individuals) maximize social and economic welfare at the sectoral, national, and global levels have ignored the wide range of real-life elements that are part of such interactions (Andersen and Konzelmann, 2008). The critique toward the utilitarian justification for the current IPR regime raises questions

regarding how the system creates value to different stakeholder groups in the innovation system (Rodrik; Piketty; Acemoglu and Akgicig, 2012; Jackson, 2009; Acemoglu et al., 2009; Sen; Stiglitz, 2007). Although the current IPR regime is assumed to deliver welfare for all stakeholders, it might be causing just the opposite (Andersen and Konzelmann, 2008).

Although the literature has identified the heterogeneity of the IPR system stakeholders, there is relatively little research discussing their differing viewpoints. For example, the literature has focused on questioning earlier policy framings (Schot and Steinmueller, 2018) and a protection model that could best serve the innovation system as a whole (Acemoglu and Akgicig, 2012; Hall, 2007). These perspectives rarely take individual stakeholders' views into account, even though we have evidence on the importance of the quality and nature of stakeholder relationships within the IPR systems (Andersen and Konzelmann, 2008) and that a more "comprehensive, integrative approach" would be called for (Kochenkova et al., 2016). Although organizations with high internal capabilities can operate in innovation system with weak institutional and policy environments (Zhao, 2006) and institutional arrangements often favor the incumbent, broad stakeholder involvement can allow creating improved IPR regime without reducing its impact (Laplume et al., 2014). The literature has suggested that stakeholder multiplicity

* Corresponding author. Department of Industrial Engineering and Management, Tampere University, Korkeakoulunkatu 8, PL 541, 33014, Tampereen yliopisto, Finland.

E-mail address: arho.suominen@tuni.fi (A. Suominen).

<https://doi.org/10.1016/j.technovation.2023.102719>

Received 27 December 2021; Received in revised form 23 January 2023; Accepted 5 February 2023

Available online 2 March 2023

0166-4972/© 2023 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY license (<http://creativecommons.org/licenses/by/4.0/>).

(Neville and Menguc, 2006), "the degree of multiple, conflicting, constituent expectations exerted on an organization" (Oliver, 1991), has an significant impact on the IPR system ability to create positive outcomes (O'Kane et al., 2021).

The present study addresses this gap in the literature to better understand the differing viewpoints of the IPR system stakeholders. We explicitly focus on the following research questions: Are there tensions between IPR system stakeholders regarding the structure, objectives, and benefits of the system? If so, where do stakeholders reach an agreement? Using the Delphi method, the research engaged stakeholders from government, higher education, industry, and not-for-profit organizations representing industry or content creators; a structured communication process was used to envision a more inclusive IPR regime. The research was carried out as a part of a project funded by the Finnish government to provide research-based policy advice for the government's IPR strategy renewal. The current research work focused on broadly engaging stakeholders to provide research-based advice on how to develop the national innovation system's approach to IPR to be more inclusive, namely to consider supporting the creation and dissemination of information or creative content, hence promoting sustainable growth, enabling scientific research, and increasing productivity and competitiveness. With Finland being the case study country, the context of the research is of a highly innovative developed small open economy.

2. Background

2.1. IPR and growth – a contentious relationship

The ambiguous relationship between innovation and IPR, along with its relationship to growth, highlights certain structural issues. The literature has indicated that approaches justifying the role of IPR in addressing market failure have not considered some of the important features of technological knowledge and have neglected the importance of the nonmarket institutions that are part of the innovation process (Andersen and Konzelmann, 2008; Dosi et al., 2006b). This is evident, for instance, in the ways in which digital technologies and the internet weave through economic life and bring into focus the success of open source collaborative production (Lerner and Tirole, 2005). Apparently, a narrow institutional network comprising of firms and governments seems limited when it comes to accounting for the actors contributing to the pool of resources revolving around the creation, development, and deployment of new technologies in modern economics. This could be attributed to the fact that the key resource is not the technology or the idea itself but the distributed and heterogeneous information that surrounds it (Potts, 2018). Technologies or the ideas gain value during the combinations process, and these combinations and the eventual commercial success are what distinguishes invention from innovation (Schumpeter, 1934). However, as Potts (2018) points out, the processes that allow for these activities often remain unaccounted for or simply unacknowledged. This is pointed out in the critique by Mazzucato (2018) on the role of government. Hierarchical institutions like firms or governments operating through indicators, such as property rights or price signals, are often inadequate in dealing with a distributed and tacit resource base that is characterized by diversity and uncertainty (Potts, 2018). For decades, innovation policy has emphasized the role of IPR as a growth agent and as a mechanism of technology transfer (Agrawal, 2001), here through a general consensus on the role of knowledge and innovations in fostering economic prosperity (Acs et al., 2002; Romer, 1990; Lucas Jr, 1988). Knowledge plays an important role in the global economic system, and economies depend on the production, distribution, and use of knowledge (Hadad et al., 2017; Clarke, 2001; Ferroni, 1998), and its role is evident in solving the challenges related to climate change, environmental sustainability, inequality, and other associated problems (Henry and Stiglitz, 2010). Therefore, it is understandable why IPRs and attendant policies gain relevance as key mechanisms for

facilitating knowledge production and diffusion. As an innovation vehicle, IPRs are framed as incentive mechanisms that encourage inputs of labour and resources for producing new ideas or innovation. Analyses of historical data have highlighted the role of patent laws in creating incentives for invention, promoting innovation, and encouraging economic growth (Moser, 2013; Khan, 2005; Khan and Sokoloff, 1993; Woo et al., 2015). However, at its core, innovation is the modification, development, and recombining of existing knowledge (Potts, 2018), and IPRs create impediments to this process by inhibiting access through monopolies that benefit the few at the expense of many (Davidson and Potts, 2016). A private IPR system constrains innovation, both through the terms of monopoly rights granted and downstream control over use or rights to exclude, hence leading to unequal outcomes (Boldrin and Levine, 2009; Buchanan and Yoon, 2000; Heller, 1998). In addition to higher consumer prices, the outcomes of IPRs also lead to centralization of industry structure resulting in the loss of adaptive benefits that decentralization offers (Wu, 2006). As products and processes have become more complex, such monopoly grants squeeze out future innovations, and with the emergence of digital platforms, where information is key to competitiveness (Tao, 2020; Akman, 2019), the importance of existing IPRs has been argued to be eroding (Athreya and Fassio, 2020; Davidson and Potts, 2017).

Our evidence on the added value of patent rights is also narrow. It focuses on a few industries taking broad advantage of patent protection (De Beer, 2016). We know that patent data do not capture innovation occurring outside the patent system. Moser (2013, 2012, 2011, 2005) has drawn from historical records of events such as a series of technology exhibitions that started with the 1851 Crystal Palace world's fair in London and that offer records of innovations both within and outside the patent system. Moser (2013) has cited research indicating how commercial research and development have used alternative mechanisms like secrecy¹ and lead time to be more effective than patents (Cohen et al., 2000; Levin et al., 1987), showing how innovation often occurs as a result of knowledge sharing, independent of patents (Thomson, 2009; Nuvolari, 2004; Allen, 1983). Moser (2013) also lists other elements such as cultural attitudes toward risk taking (Landes, 2003) and scientific experimentation (Mokyr, 2010).

The research highlighting, both theoretically and empirically, the ambiguity in the relationship between IPRs in general and patents in particular, along with development (Durand and Milberg, 2020; Sweet and Maggio, 2015; Sweet and Eterovic, 2019; Hausmann et al., 2014; Acemoglu and Akcigit, 2012), offers a more complex picture. The research has suggested that the trajectories through which discoveries are made and technological inputs initiated into practice are multiple and diverse, depend on the level of development, and present possibilities for negative consequences when overly rigorous (Sweet and Eterovic, 2019; Fu et al., 2011; Boldrin and Levine, 2013; Jaffe and Lerner, 2011). For instance, although patents might offer incentives for innovation, over time, the monopolies created by past patents reduces the incentives for current innovators subject to legal actions and licensing demands from the incumbents (Boldrin and Levine, 2013). Gold et al. (2019) demonstrates the contradictory effects of IPRs through an index evaluating the strength of IPR protection in 124 developing countries from 1995 to 2011. There is evidence consistent with IPRs leading to economic growth, in addition to leading to higher levels of technology transfer and increased domestic inventive activity, yet there are findings that complicate this picture. The evidence suggests that increased levels of growth result in high levels of IPR protection, but contrary to what the literature linking IPR with economic growth discusses, this increased level of protection does not lead to the actual use of the IPR system. In reality, IPRs may have limited effects on growth; in this case, Gold et al. (2019) state that any causality is more of a belief than the result of actual deployment of IPR. There has never been any doubt about the economic

¹ We note that trade secrets are a form of IPR.

significance of IPRs as an institutional incentive for private investment; however, the exact institutional mechanism by which this is made possible and the results thereof are less clear. As [De Beer \(2016\)](#) make clear, the frameworks of discussion on the contribution of IPR regimes are narrow and, in part, misleading, calling for a more holistic view and taking views from a broad stakeholder pool on the impact of IPR to societal gains.

2.2. Transition in the idea of growth – an innovation systems perspective

The innovation systems approach, though legitimizing and designing policies focused on research, technology, and innovation ([Lundvall, 1992](#); [Box, 2009](#); [Edquist, 2013](#); [Nelson, 1993](#)), has been limited to optimizing firm-based innovation ([Weber and Rohracher, 2012](#)). A recent debate has emphasized that we should not consider innovation as a mere market-based tool for sustaining growth but rather as a mechanism fostering broader societal goals ([Rodrik; Piketty; Acemoglu et al., 2009](#); [Acemoglu and Akcigit, 2012](#); [Jackson, 2009](#); [Sen; Stiglitz, 2007](#)). This debate has led to questioning earlier policy framings ([Schot and Steinmueller, 2018](#)) and, consequently, reminders (see [Giuliani, 2018](#)) of how the earlier framings willfully ignored clear warnings ([Freeman and Soete, 1997](#); [Freeman et al., 1982](#)). [Giuliani \(2018\)](#) cites [Cimoli et al. \(2014\)](#) in illustrating how our existing regime has looked at socially and environmentally relevant issues reflecting the negative effects of IPR protection. [Giuliani \(2018\)](#) has focused on the growing role and influence of large multinational corporations, along with how these developments influence policies, including those related to IPRs ([Giuliani, 2018](#)). This highlights how governance has been unable to take a balanced view, instead focusing on protecting the incumbent ([Laplume et al., 2014](#)).

The innovation systems approach is argued to address the alleged market failure associated with the production of new ideas ([Arrow, 1962](#)). This has led to a complex mix of interventions, laws, regulations, transfers, and publicly funded organizations that range across intellectual property rights, R&D tax credits, sector-specific industry policy, targeted public procurement, technology transfer, publicly funded research by universities, and public science institutes. Although the impact of different policy approaches vary between innovation systems, particularly those related to IPR ([Ge and Liu, 2021](#)), the broad consensus among economists (see [Martin and Scott, 2000](#)) supports the argument of market failure and subsequent role of the state in correcting it. This is captured in the articulation of Nelson, where he posits that if the field of basic research were "... left exclusively to private firms operating independently of each other and selling in competitive markets, profit incentives would not draw so large a quantity of resources to basic research as is socially desirable." [Nelson \(1959, p. 304\)](#) However, putting emphasis solely on economic growth and the abilities of national economies or industrial sectors alone for generating innovations limits the innovation systems' approach toward managing challenges of more fundamental types of transformative change ([Weber and Rohracher, 2012](#)).

For instance, the analysis of [Miettinen \(2002\)](#) of the national innovation systems (NIS) approach in Finland highlights the narrow science, technology, and innovation focus of the political rhetoric as an insufficient basis for policy-making in Finland. Further, [Berg and Hukkinen \(2011\)](#) demonstrates that, even when Finnish industry highlights the importance of broader social goals, this critique only increases uncertainty and complexity in the policy field. These findings reinforce the call for a more comprehensive IPR regime that would include a broader pool of vantage points by different stakeholders ([Kochenkova et al., 2016](#)). Broad stakeholder involvement could lead to improving the impactfulness of the IPR system ([Andersen and Konzelmann, 2008](#); [Laplume et al., 2014](#)). This would, however, require better awareness of the expectations of actors within the systems. [Neville and Menguc \(2006\)](#) writes about the "salience of interactive relationships within the particular stakeholder roles," highlighting the need to understand the

"hierarchy of multiplicity influences." For instance, the literature has suggested that organizations with high internal capabilities can complement system-level challenges with their internal capabilities ([Zhao, 2006](#)) and that small- and medium-sized enterprises are at a disadvantage ([European Commission, 2020](#)). In addition, governmental institutional arrangements are often designed to favor the incumbent ([Laplume et al., 2014](#)). The IPR system has also been unable to resolve the tension between the production and utilization of scientific knowledge ([Ejermo and Toivanen, 2018](#)). These types of tensions between stakeholders would require a mechanism, such as a polycentric approach, that would allow them to be resolved.

Polycentricity has been described as a system comprising of multiple interdependent yet autonomous decision centers that operate under an overarching set of rules and norms set up through consensus, that are then monitored and enforced ([Carlisle and Gruby, 2019](#); [Aligica and Tarko, 2012](#); [Ostrom, 1999a, 1999b](#); [Ostrom et al., 1961](#)). This conceptualization would highlight the assemblage of actors and entities implicated in innovation processes and, in doing so, create opportunities for a more distributed incentive system that, in turn, could lead to more ways of recognizing and creating value. Polycentric governance would make designing such incentive systems possible because it incorporates decision-making centers that take each other into consideration in competitive and cooperative relationships and resolve the conflicts that might arise ([Carlisle and Gruby, 2019](#); [Ostrom et al., 1961](#); [Marshall, 2015](#)). This goes beyond the standard theoretical and policy model where the institutions of government correct market and systems failures in the production of knowledge ([Arrow, 1962](#); [Nelson, 1993](#)), moving toward the economic institution of innovation of commons. It is possible for new knowledge to be a common pool resource ([Madison et al., 2009, 2016](#)) and to form communities that can create and enforce governance rules for facilitating cooperation while overcoming those dilemmas related to peer production ([Frischmann et al., 2014](#); [Hess and Ostrom, 2003](#)).

In polycentric governance models, the decision-making units often overlap because they are nested within multiple jurisdictions at the local, regional, and national levels while including special purpose governance units that span these jurisdictions ([Carlisle and Gruby, 2019](#); [McGinnis and Ostrom, 2012](#)). Multilevel configurations are supported with governance arrangements with polycentric characteristics that could strike a balance between centralized and fully decentralized or community-based governance ([Carlisle and Gruby, 2019](#); [Imperial, 1999](#)). The ability to create systems of governance that are more selective in local and regional specificities has been seen as central to innovation systems ([Hussler et al., 2010](#)). However, for such a governance system to exist, there needs to be better coordination between these decision-making centers. [Carlisle and Gruby \(2019\)](#) have suggested that these decision-making centers take each other into account in competitive and cooperative relationships and also acquire the capabilities for resolving conflict.

In summary, a polycentric mechanism enables a system that takes a comprehensive view of innovation processes while limiting the domination of any single interest group. This is key within the context of knowledge economies, where IPRs need not be the only mechanisms through which knowledge is financed, incentivized, and organized ([Baker et al., 2017](#); [Henry and Stiglitz, 2010](#)). As a shared resource, knowledge requires new forms of conceptualizations and analysis that can capture its globalized and complex dimensions ([Hess and Ostrom, 2005](#)). In addition, the environment based in the current rapidly expanding world of distributed digital information presents both possibilities and pitfalls, and this paradox is indicative of the deep and perplexing characteristics of knowledge ([Hess and Ostrom, 2005](#)). In this context, a polycentric mechanism characterized by decentralized and alternative areas of authority with multiple levels of rule and decision-making could be more effective in constructing an innovation system-level approach to IPR.

3. Data and method

3.1. Delphi

The Delphi method is one of the most well-known approaches used to engage a large group of experts on a given topic. Developed in the Rand Corporation in the 1960s, the method's central idea is to alleviate the challenges of face-to-face human interaction and facilitate dialogue (Dalkey, 1967; Dalkey and Helmer, 1963). The important benefit of the Delphi method is that it allows for a group of experts to have moderated dialogue around a topic, where the discussion is also anonymous, which aids in underscoring the importance of making well-founded arguments.

In the nearly 60 years of applying the Delphi, there is an extensive list of literature that has applied the method. In a recent review, Flostrand identifies nearly 2600 papers, over 500 of which central to the Delphi method and its ability to leverage the expertise of a group of experts on a given subject. The method has been extensively applied in technological forecasting (Daim et al., 2012; Suominen et al., 2011), scenario planning (Bradfield et al., 2005), and especially in healthcare (e.g. Veenstra et al., 2017; Efstathiou et al., 2007), representing roughly 60 percent of all Delphi method publications.

Within the plethora of studies, the Delphi method has been conducted in several ways. Originally, Dalkey (1967) described the procedure as consisting of a first round and several following iterations. The idea is that, with the first questionnaire, the respondents are requested to assess a set of numerical quantities, such as dates for future events. The results from the first questionnaire are then summarized and given as feedback to the respondents. In the second round, the respondents are then asked to assess their earlier answers in light of the new information. Answers that deviate significantly from the median are also asked to justify their answer. The process can be extended to those rounds going beyond the second one, here in some cases moving toward a consensus. More recently, there have been several developments and variations to the traditional Delphi approach. These have focused on computer-aided facilitation of the Delphi method (Steinert, 2009), integration of quantitative approaches (Varho and Tapio, 2013; Tapio et al., 2011), and the development of results for scenarios or roadmaps (da Silveira Junior et al., 2018).

3.2. Expert selection and arguments

To analyze the challenges of a change in the IPR system, it was essential that we could enable a broad-based dialogue on the challenges of change without a strong emphasis on individual perspectives. This is where Delphi's ability to moderated dialogue is essential. Central to the Delphi process is the selection of experts (e.g. Devaney and Henchion, 2018). The goal is to have the widest possible representation of different perspectives. Drawing from the framework of stakeholder multiplicity (Neville and Menguc, 2006), we utilized the stakeholder salience model, which takes into account the different characteristics of the stakeholders. The aim is to ensure that all types of stakeholders are represented by the Delphi experts.

The stakeholder salience model goes back to the seminal work of Mitchell et al. (1997) on the theory of stakeholder identification and salience. Mitchell et al. (1997) focus on how managers identify and prioritize the stakeholders of an organization. However, the approach is also useful for Delphi expert selection, where the identification and salience of stakeholders is key. The stakeholder salience model uses three parameters to select stakeholders: power, legitimacy, and urgency. Power is defined as the ability of the stakeholders to influence the topic. Legitimacy is defined as the authority and level of involvement that the stakeholder has on the topic. Urgency is related to the time that the stakeholder expects for receiving a response to their expectations. There has been discussion on revising the this theoretical framework (Neville et al., 2011), but the overall framework is often illustrated as a overlapping Venn diagram, where these three parameters overlap, creating

seven stakeholder types and nonstakeholders.

The objective of the present study was to focus on four stakeholder groups. As shown in Table 1, the first groups was the one where the stakeholder had the power, legitimacy, and urgency. These were the critical stakeholders. In addition to the core group, we also included stakeholders that had power and legitimacy but did not identify the urgency of the topic. We also looked at dependent groups (Group III) that lacked the power to impact change but had both legitimacy and a sense of urgency. Finally, we also looked at Group IV, which only had power but might not have legitimacy or urgency.

In addition to the attributes, the selection of experts took into account the sectors, that is, the balance between the public, research, business, and other social actors. In addition, the selection of experts sought to take into account that the selection was gender balanced. The network of the project research team and its steering group were used to identify the experts. In addition to these, the RocketReach SaaS service was utilized, enabling the global identification of experts based on keywords, geographical location, and training. We identified a total of 126 potential experts (Table 2) to be invited to the Delphi process, roughly doubling the number of experts needed. This was done to accommodate the refusal of invited experts to join the panel.

In total, using the research team's and project steering group network and complementing this by the use of the SaaS service, experts from all other except for Group IV were identified. The analysis of to which group an expert belonged was done based on their organization and role description. The Delphi expert labeled as company included experts from a broad range of Finnish companies ranging from micro to large companies. The invited experts were company representatives with direct responsibility of IPR related matters, for example, IPR managers. The government representatives included officials mainly from the ministries on economics and employment and higher education. The invited officials were selected based on their IPR-related expertise. The higher education representatives included both universities and polytechnics representatives responsible for academy-industry collaboration and technology transfer. The not-for-profit (NPO) representatives are divided in Table 2 into the two groups of industry and government. The NPO industry group included representatives from not-for-profit organizations directly linked to industry, for example, trade organizations, but it also included, for example, copyright advocacy organizations. The NPO government category included experts from government-funded organizations such as the patent and trademark office and innovation funding agency.

3.3. Delphi operationalization

We used a literature review approach to identify the relevant arguments to be included in the Delphi study. We started the analysis by searching the SCOPUS database on the scientific literature, focusing on the national innovation system and IPR. This was complemented with a search of the literature that focused on IPR and the case study country, Finland. In addition, we identified key policy and gray literature documents from the case study country to be included in the analysis. A total, we found 338 articles dealing IPR strategy on a national level and a further 150 articles focusing particularly on Finland. The most important articles were identified by the title and abstract against the research

Table 1
Stakeholder salience model used to select the experts for the Delphi method.

| Stakeholder group | Total | Parameter | | |
|-------------------|-------|-----------|------------|---------|
| | | Power | Legitimacy | Urgency |
| Group I | 20–24 | X | X | X |
| Group II | 16–20 | X | X | |
| Group III | 12–16 | | X | X |
| Group IV | 8–12 | X | | |
| Experts in total | 56–72 | | | |

Table 2
Identified experts using the stakeholder salience model.

| Stakeholder Group | Total | Gender | Total. | Type | Total |
|-------------------|-------|--------|--------|------------------|-------|
| Group I | 23 | Men | 73 | Company | 59 |
| Group II | 53 | Women | 53 | Government | 12 |
| Group III | 50 | | | Higher education | 9 |
| Group IV | 0 | | | NPO - Industry | 13 |
| | | | | NPO - Government | 33 |

objectives of the study.

Based on the literature, a total of 48 arguments were identified. The inclusion criteria for the arguments were that they made a clear argument on the IPR system at a national innovation system level. As an example from [Ejermo and Toivanen \(2018\)](#), “Adding the period after announcement to the reform period increases the drop in academic patenting to 46 percent. Our and others’ results call into question whether the European reform of the professor’s privilege were good innovation policy.” ([Ejermo and Toivanen, 2018](#)) After identification of an argument, the researchers filled out an Excel spreadsheet table with the argument, why it was added, the citation, and a draft of a Delphi argument. When the literature review was completed, the arguments were assessed by a project team seeking to identify the key arguments for the study. The starting point was that no more than 30 arguments were selected so as to keep the workload reasonable for the experts. Three project team members independently scored the arguments in relation to the objectives of the study. The 27 highest scoring arguments were included in the Delphi process. The arguments with their justification and reference are given as an appendix.

We utilized Welphi and Webropol software to operationalize the Delphi approach. The software enables the facilitation of a fully digital Delphi process. On the platform, the experts were presented with arguments about the potential need for changes in IPR system in the near future. The experts assessed the significance of the arguments and provided free comments to justify their position. Central to the Delphi method is that the respondents can justify their positions and, thus, have a dialogue behind anonymity that is moderated by the researcher. The experts relied on the researchers to ensure that the participants were well selected and to ensure a sound discussion, moderation, and anonymity. In practice, the Delphi process was implemented in two rounds. In the first round, the experts were presented with arguments about the challenges of facing the Finnish IPR system. The experts evaluated the significance of arguments using a Likert scale, as well as justifying their position with open comments. The software tool used specifically called on the respondents who responded with either “strongly disagree” or “strongly agree” to justify their position. In the first round, the experts were also free to comment on Finland’s IPR system as an open ended question.

In the second round, the experts were presented with the same arguments again but with summaries on the results from the first round. The summary included descriptive values for the Likert-scale responses for each question. In addition, the researchers compiled a narrative of all comments into a question, ensuring that both positive and negative statements were represented. The narrative was written in a manner so that it only included the comments by the experts and all the vantage points presented. The researchers made a clear effort to not influence the narrative with their own views, only to make the experts comments into one cohesive text. In the second round, the experts were asked to re-evaluate the Likert-scale variables. The experts were also asked to comment on the narrative from the comments arising from the experts in the previous round. In addition, suggestions for concrete policy action were encouraged. The results from the study, as presented in following section, include the Likert-scale response and merged narratives from the experts. The results are presented in a way that the individual argument narratives were compiled into one cohesive text with minimal intervention by the researchers. This was done to ensure that the results

would reflect the views of the experts, not that of the researchers.

The experts invited to the first round of Delphi were sent an email invitation to participate in the Delphi process. A response time of two weeks was given, during which two reminder messages were sent. A total of 48 experts participated in the first round of the Delphi process. After the analysis of the results of the first round, 48 experts were invited back to participate in the second round. A total of 35 experts returned to respond to the next round of the Delphi process. For one question, because of an error in the tool, the experts were called back to review one question independently. The description of the process can be seen in [Fig. 1](#).

The results of the study were analyzed using the Likert-scale responses and open comments by the experts. The narratives from the first round formed the basis of the qualitative analysis of the results. Integrating the supporting and critiquing comments from the second round, the research revised the narratives to form the narrative, which was given as a result of the Delphi process. In addition to the qualitative narrative, we calculated the average percent of majority opinions (APMO), which was used as a consensus measure ([Kapoor, 1987](#)). Consensus, either as agreement or disagreement with the argument, can be defined as follows:

$$APMO = ((A + D) / T) \times 100,$$

where A is the majority agreements, D is the majority disagreement, and T is the total number of responses. The APMO measurement is often used to indicate when an argument can be taken out from the consecutive rounds of Delphi or when the Delphi exercise can be concluded. In the present study, we report on the APMO score on both rounds, using the value to measure if there is broad stakeholder consensus within the identified arguments.

4. Results

The Delphi arguments drawn from the analysis of literature, interviews, and subsequent selection by the research included multiple different vantage points toward the IPR system. The selected 27 arguments covered structural issues, capability building, and legislative issues. The arguments can be seen in appendix [Table 5](#) with aggregate results shown in [Table 3](#) for round 1 and in [Table 6](#) for round two.

According to the Delphi experts, Finland’s IPR system is of a high quality. This does not eliminate the need for development. The experts were particularly critical of copyright legislation. the IPR of universities, the resourcing of public actors, organizational competence, and training and consultancy. The below subsections describe the responses by the experts in narrative form. The text is based on the synopsis written by the researchers, which is based on the open-ended comments by the Delphi experts within the Delphi rounds. Researcher comments are provided as footnotes.

4.1. Lack of capabilities and access to the playing field

A lack of competence was identified as one of the key challenges facing Finland’s IPR system. The experts argued that the competences to participate in the IPR system are not equally distributed and, for example, small- and medium-sized enterprises are poorly equipped with the knowledge needed to take part.² The experts felt that the lack in capabilities begins with education, stressing the fact that higher education degrees should require at least the basics of IPR. In improving the IPR system and making it more inclusive, it would be central to increase knowledge on how the protection of IPRs work and, for example, how IPR owned by other organizations impact your freedom to operate.

² In many ways, this is paradoxical because Finland is often listed as one of the most innovative countries in the world.

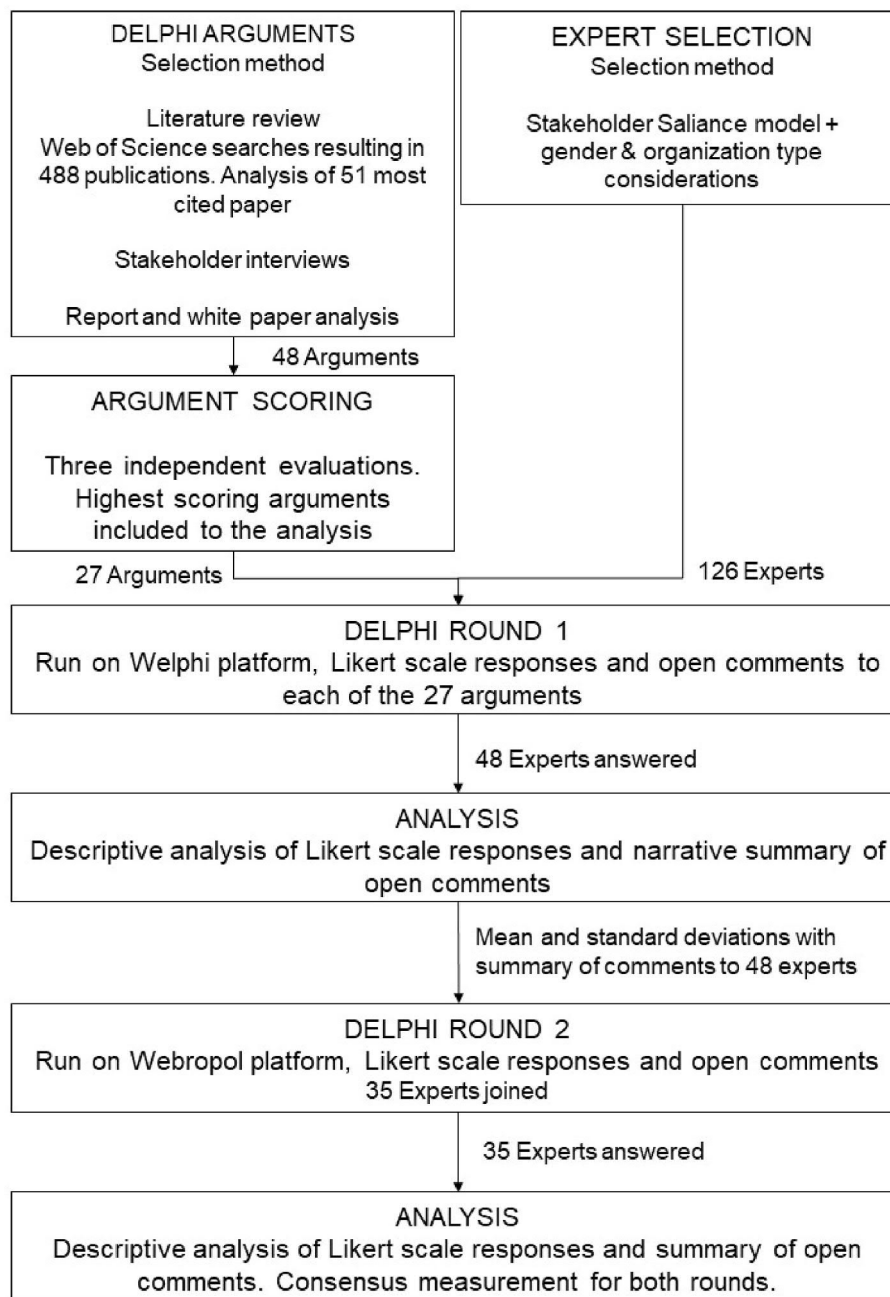


Fig. 1. Process description for the Delphi study.

Currently, the Delphi experts were critical about the availability of training and consultancy. The experts noted that, previously, there was a comprehensive network of innovation agencies in Finland funded by the Finnish Invention Foundation. As the Ministry of Economic Affairs and Employment stopped funding the foundation, access to the IPR system has become more difficult for individuals and organizations with lower capabilities. In building an inclusive IPR system, innovation system actors need to be able access counseling or centralized advice from experts. The experts argued that counseling should be able to assist with IPR processes, but also be extended to the substance and business logic of IPR. This being said, we should note that some experts were critical of centralization and made clear distinctions between advising on processes and business development. The experts argued that, instead of concentrating on advice, there was a need for better division of labour between different actors. It would not be appropriate to have a public entities that give advice on the exploitation of intangible rights, but

here, commercial operators should be involved.

The experts stressed that companies, particularly small- and medium-sized enterprises, are not homogeneous in terms of their ability to take part in the IPR system. Even small- and medium-sized innovative companies can be extremely capable in exploiting and managing IPR, particularly if the value of their entire business relies on it. The experts noted that it might not be that size matters; rather, the playing field is increasingly polarized: an increasingly larger number of stakeholders understand the impact and importance of IPR very well, yet some still see the whole thing as completely alien. The experts shared the view that the current IPR regime makes taking advantage of IPR challenging for smaller entities because of the high cost of investment in IPR and the difficulty of using IPR as an asset. In addition, concerns about being able to defend and identify infringements were high. The experts saw that the patenting process favors companies with the know-how and resources to exploit the patent system. Patenting and patent defense are very

Table 3
Aggregated results from round 1.

| Begin of Table | | | | | | | |
|----------------|--|-------------------|-------------------|---------------------------|----------------|----------------|-------------------|
| # | Delphi argument | Strongly disagree | Somewhat disagree | Neither agree or disagree | Somewhat agree | Strongly agree | Unable to comment |
| 1 | The main shortcoming of the IPR system is the low level of competence of different organizations. | 4.30% | 34.00% | 19.10% | 40.40% | 2.10% | 0.00% |
| 2 | Small- and medium-sized enterprises lack an overall view of the importance of IPR and intangible assets in their business. | 2.10% | 10.60% | 4.30% | 63.80% | 14.90% | 4.30% |
| 3 | The advice on IPR has been fragmented for various public actors. Finland lacks centralized advice on IPR ("IPR-helpdesk"). | 4.30% | 14.90% | 8.50% | 53.20% | 19.10% | 0.00% |
| 4 | Universities do not have the incentive to produce IPRs. | 6.40% | 12.80% | 27.70% | 29.80% | 10.60% | 12.80% |
| 5 | Most innovations are made outside Finland. The national IPR system should make it possible to better "copy" and utilize foreign innovations in Finland. | 14.90% | 40.40% | 14.90% | 21.30% | 4.30% | 4.30% |
| 6 | Higher education institutions need more practical education and training on IPRs (e.g., practical agreements). | 0.00% | 2.10% | 4.30% | 38.30% | 48.90% | 6.40% |
| 7 | Copyright law is fragmented and outdated, highlighting the need for overall reform. | 4.30% | 10.60% | 21.30% | 38.30% | 8.50% | 17.00% |
| 8 | Concentrating copyright and industrial rights in the same ministry would help improve coherence and clarify the system. | 4.30% | 4.30% | 19.10% | 40.40% | 27.70% | 4.30% |
| 9 | There is no adequate basic education on IPRs for university students. | 0.00% | 8.50% | 14.90% | 42.60% | 25.50% | 8.50% |
| 10 | Researchers do not have sufficient knowledge of IPRs, and these issues are not included as a mandatory part of researcher training. | 0.00% | 6.40% | 12.80% | 51.10% | 12.80% | 17.00% |
| 11 | Copyright law reforms are complicated by their juxtaposition to other IPRs. | 17.00% | 27.70% | 17.00% | 25.50% | 0.00% | 12.80% |
| 12 | The reform of IPR should increasingly aim to include industry-specific weightings (e.g., the extent of protection). | 6.40% | 42.60% | 19.10% | 23.40% | 4.30% | 4.30% |
| 13 | IPRs do not sufficiently support innovation in the digital and green economy. For example, more clarity is needed to protect new models. | 4.30% | 23.40% | 31.90% | 29.80% | 6.40% | 4.30% |
| 14 | Concentrating on IPR disputes at the Market Court has been a good solution and has helped to increase IPR-related expertise. | 0.00% | 2.10% | 12.80% | 38.30% | 34.00% | 12.80% |
| 15 | IPR skills have not been sufficiently resourced in the ministries, and this is reflected in a skills gap. | 0.00% | 2.10% | 21.30% | 34.00% | 36.20% | 6.40% |
| 16 | European copyright legislation (e.g., the EU directive on copyright in the digital single market) is transforming the market in favor of large platforms rather than protecting the creative industry and consumers. | 4.30% | 23.40% | 34.00% | 12.80% | 2.10% | 23.40% |
| 17 | To increase research-based patenting and the ability to make economic use of scientific results, researchers should be given stronger rights to exploit the results of research. | 10.60% | 25.50% | 12.80% | 31.90% | 8.50% | 10.60% |
| 18 | Public awareness and competence in IPR matters is clearly weaker in Finland than in forerunner countries (e.g., the United States or Korea). | 2.10% | 12.80% | 27.70% | 36.20% | 6.40% | 14.90% |
| 19 | An IPR box and/or tax incentive would increase the importance of IPRs and encourage the exploitation of IPRs as part of the business model. | 2.10% | 8.50% | 21.30% | 44.70% | 14.90% | 8.50% |
| 20 | SMEs are reluctant to take advantage of IPRs, largely because of a lack of information. | 2.10% | 8.50% | 14.90% | 59.60% | 10.60% | 4.30% |
| 21 | Stronger sectoral measures are needed to combat IPR abuses. | 0.00% | 17.00% | 36.20% | 25.50% | 14.90% | 6.40% |
| 22 | The patenting process has changed to favor large companies capable of creating large patent portfolios, leaving small- and medium-sized enterprises at a disadvantage. | 4.30% | 25.50% | 25.50% | 29.80% | 8.50% | 6.40% |
| 23 | Finland's IPR system (institutions, administration, legal base) is competitive and of a high quality, and there is no significant need for development. | 6.40% | 46.80% | 17.00% | 25.50% | 4.30% | 0.00% |
| 24 | Finland does not have sufficient ambition to influence the development of EU legislation on IPRs. | 2.10% | 8.50% | 25.50% | 40.40% | 12.80% | 10.60% |
| 25 | The European digital single market enables the licensing of copyrighted content in the EU economic area in an adequate manner. | 2.10% | 10.60% | 40.40% | 21.30% | 0.00% | 25.50% |
| 26 | Sufficient measures have been identified and taken in Finland to make greater use of open source in society. | 0.00% | 10.60% | 46.80% | 14.90% | 2.10% | 25.50% |
| 27 | Data can be an important source of revenue for creative industries but only if the free movement of data is effectively protected by the regulation of IPRs. | 2.10% | 12.80% | 23.40% | 40.40% | 6.40% | 14.90% |

expensive in many areas and lead to only the largest being able to afford large patent portfolios. The experts said that the process as such does not disenfranchise, but the problem is the price of defending rights, as well as the slowness and inefficiency of the process. Regarding the defense of rights, the experts highlighted that, in the current legal system, protection ultimately relies on the effectiveness and smoothness of judicial process and their subsequent coercive measures. In this, the experts noted that cost-effective ways of intervening are absent. The cost of litigation and threshold for evidence easily leads to rights holders not wanting to bare the legal risk, even when there is a seemingly winning case.

The experts were also skeptical that innovation tools such as tax

incentives would enable participation. Although the experts welcomed the use of tax subsidies to increase the importance of and encourage the exploitation of IPR, they argued that it is a challenge to find a model that would be fair and objective while leading to an optimal outcome for the national economy. Those experts critical of tax aid considered a subsidies mechanism, such as tax incentives, to be outdated. The experts argued that companies make decisions on a business basis and that the tax subsidy is not significant here. It was also suspected that the costs of setting up and maintaining the scheme hardly cover the benefits. Companies take time to deal with the bureaucracy involved in the system.

4.2. Who sets the policy agenda?

The objectives of the ministries³ regarding IPRs are, at best, only partly aligned. The experts were critical if there could be a path for creating IPR systems in which the objectives would extend the narrow policy agendas driven by sectoral ministries to include broader societal impacts.⁴ The experts envisioned that including a larger pool of ministries with different objectives and having a larger pool of civil servants knowledgeable on the basics of the IPR system would enable the identification of issues relevant to IPR within their sector. This would ultimately lead to broader societal and economic impacts when it came to IPRs.

The experts were also vocal on the skills gaps in the ministries. Although skills gap is a strong expression, the lack of resources of the ministries inevitably reflects the drafting of legislation and management of the entire IPR system. The experts noted that the ministries do not have sufficiently knowledgeable resources and that there is a general lack of manpower to develop the system. For example, the experts raised the reform of the Patent Act, which has been long awaited, but there has not been sufficient resources to implement the reform. The experts highlighted that the lack of resources is telling of the state of play and perceived importance of IPR within policy-making.

The lack of policy resources also limits Finland's cooperation in developing the European and global IPR systems. According to the experts, the lack of resources is visible in Finland's cooperation in the EU. Participation in the development of EU legislation would require resources that are currently not sufficient, ultimately leading to others setting the policy agenda. The experts further argued that if there is a difficulty in forming a common national vision, Finland would be unable to partake in the geopolitics of IPR. Among the highly critical voices of the experts, we should note that some experts did see Finland as larger than its size in developing the global IPR system. Finland has been active in working in Nordic cooperation to set the agenda on how the multinational IPR system should work. A common vision, as shared by the Nordic countries, has played a significant role in transforming the policy agenda globally.

4.3. IPR and access to scientific knowledge

The experts stressed that the journey from research to commercialization is long, resource demanding, and, as always in innovation, having most of the projects fail. Universities and research organizations have very little resources available for protection and commercialization, particularly in relation to the large number of potential inventions. The experts were highly critical if research organizations can, and should, strive to create large IPR portfolios.

The experts emphasized that it is the researchers' intellectual work that forms the basis for the potential inventions, but there is little incentive to produce IPR. Some experts saw that rights should increasingly belong to the researchers themselves, to commercialize or make publicly available. The experts noted that university ownership of the knowledge produced limits researchers' motivation to make inventions. The lack of motivation—and, hence, tension—is amplified by the lack of competence in higher education institutions in commercialization. An example of a concrete challenge is that higher education institutes impose very difficult and tough conditions on research

³ In Finland, IPR-related policy is divided into two ministries: the Ministry of Economic Affairs and Employment and the Ministry of Education and Culture. The ministries have a specific domain focus, as their names indicate.

⁴ Finnish public discussion has extensively covered IPR issues relate to COVID-19 vaccines, and, in particular, a case relating to a Finnish vaccine, which struggled to find a path forward, at least partly due to the IPR system. https://yle.fi/uutiset/osasto/news/finnish-developed-open-source-coronavirus_vaccine_nearly_ready_for_testing/11342151.

commercialization. The experts noted that this makes little sense because it automatically leads to the feeling that researchers should not even try to participate in the IPR system. The experts also saw that universities are in a weak position in contract negotiations with companies because of the lack of capabilities, which ultimately reduces their bargaining power.

The views of the experts were, however, somewhat divided. Some experts said that university resources and expertise are needed to utilize the research results. Although the experts agreed that, in principle, a deep commitment also through ownership from the inventor would be beneficial, in practice, individual researchers do not have the resources (knowledge, financial, or other) to protect and exploit their results. Thus, giving stronger rights to individual researchers would not solve the problem, but universities should be allocated more money for protection. That being said, the experts called for clear and adequate incentive mechanisms for researchers. The experts saw that seeking and upholding IPRs in the current system is so expensive that it is not crucial whether a researcher gets the rights or not. Also, exploitation deals more with capabilities and motivation and the ability to bring together experts on different aspects of the commercialization. The rules of the game should be clear and create practices where actors in a weaker position can involve larger players on reasonable terms and early enough. An effective division of labor is central to this. Finally, it should be noted that a portion of the experts felt strongly that research carried out with public funding is, in principle, the property of society and that its results must be utilized in the best way. In many cases, this does not mean IPR.

4.4. Copyrights in our increasingly creative and digital world

The IPR system is increasingly not about patenting, but also about being able to use copyrights for creative works. The experts noted that copyright law has become a technically difficult legislative instrument that is due for an overall reform. The experts particularly commented on the challenges of creating a transnational market for copyrighted content. Reflecting on the policy efforts in the EU, the experts stressed that, although the EU's digital single market (DSM) would enable copyright content sales, the legislation is becoming so complex that only large companies will survive. Interestingly, the experts highlighted that the European DSM legislation aims to do exactly the opposite by reducing the market power of large platform services. The experts used the example to highlight the difficulties of creating a transnational IPR system. Although the experts agreed that if European DSM is fully implemented into member country national law, the market should change for the better for both rights holders and consumers. The risks, however, are that the legislation would not enter into force properly or that EU member countries would not succeed in uniform implementation.

In terms of data and software, the experts noted that licensing practices are national and comply with analogue world principles. Significant progress is needed to ensure that the EU's internal market can operate in the best possible way. The importance of data and data-driven new services are a significant potential source of income in the creative industries. The effective protection of data and content with IPR must be possible in practice, not just on paper. Data also involve data protection and competition law regulation and, in certain situations, trade secrets; these must also be taken into account when assessing the IPR system. The experts noted that the free movement of data is important, but it is achieved not by the regulation of IPR, but by open standards and interoperable practices. Open source or open information does not conflict with the IPR system; rather, they complement each other. It then becomes a question of strategic choices. In the data economy, the mobility and reuse of data are key; the movement and efficient utilization of data requires managing, identifying, and providing data for reuse for benefit everyone—on transparent and equitable terms.

Some of the experts were critical of the need for overall reform. The experts argued that the Finnish copyright system is a modern Nordic

system that compares internationally. An expert argued that, in developing copyright in Europe, the Nordic countries are seen as showing the way and that critique of the system is often not based on facts. Although industrial change has been rapid, it does not require that the legislation adapt to everything. However, the experts did identify that employee rights should be a key development area, especially in the higher education sector. However, these reforms should take place mainly at the EU level.

On reforms, the experts commented on the challenges with sector-based ministries. The experts positively viewed the possibility that copyright and other IPR, such as patents and trade secret protections, would be under the same ministry. The experts also highlighted that this should indeed lead to a broader reform that also takes into account important synergies with a digital environment. Copyright is increasingly seen as a central element in the economic impact of IPR. This also means that the creative industry and actors will also have to take into account the basic principles of business and market economy in their operations. The experts critical of deeper integration in copyright and other IPR argued that there is few to no benefits in a more centralized approach. This is because that both copyright and other IPR are quite complex, and it is difficult to find clear synergies between them.

4.5. Looking for a path forward

Focusing on the tensions and trade-offs of developing national IPR systems for fostering creativity and innovation, we analyzed the arguments that, after two rounds, still held tension and that had reached a consensus. As shown in Table 4, the central finding is that, at an innovation system level, we can reach a consensus on very little and that tensions on the path forward remain significant. On only 4 of the 27 arguments, the Delphi process moved from a disagreement to consensus (Arguments 5, 8, 9, 10); on five arguments, there was consensus already from round one (Arguments 2, 3, 6, 14, 15), and with one argument, the experts moved from a consensus in round one to disagreement (Argument 20). Focusing on APMO values, the first round APMO was 0.689 and for the second round APMO was 0.709. Although we see an increase in the APMO values toward the second round, the improvement is relatively marginal and not suggesting a major improvement. We also analyzed if the Delphi arguments originating from different sources had a systematically lower consensus. Arguments which were interview-based arguments, half, nonscientific arguments 40% and from scientific literature arguments 11% led to consensus. It is clear that the experts' views on scientific findings had the highest tension among the respondents, while stakeholder interview-based arguments showed the greatest level of consensus.

There is a consensus on the existence of a skills gap. Arguments focused on a skills gap in policy, academia, or industry were among the ones where consensus was reached, with the exception of Argument 1, which did not reference a particular organization. On processes and practices, the experts did not reach a consensus, with the exception of two arguments (8 and 14) that pushed for more concentrated policy. The experts stressed the fact that, in its current form, the IPR system is not inclusive to smaller economic actors, researchers, and creative industry actors and that a more inclusive system would be beneficial. The disagreement among the experts was around if, and what type of, reform is needed to better enable different actors to benefit from IPRs.

5. Discussion

The results of the Delphi study have highlighted the fact that the current IPR system is not inclusive in terms of addressing the dynamic concerns and issues associated with the different stakeholders. The Delphi process resulted in a tension between the stakeholders, even with arguments drawn from scientific results. A case in point are argument #22, which is drawn from Blind et al. (2006), and #17 Ejermo and Toivanen (2018), highlighting the inequalities of the system. Here, the

Table 4
Delphi statements reaching consensus or remaining in tension measured against APMO.

| # | Theme | Argument | Round 1 | Round 2 |
|----|-------|--|---------------------|---------------------|
| 1 | 4.1 | The main shortcoming of the IPR system is the low level of competence of different organizations. | Tension | Tension |
| 2 | 4.1 | Small- and medium-sized enterprises lack an overall view of the importance of IPR and intangible assets in their business. | Consensus, positive | Consensus, positive |
| 3 | 4.1 | The advice on IPR has been fragmented for various public actors. Finland lacks centralized advice on IPR ("IPR-helpdesk"). | Consensus, positive | Consensus, positive |
| 4 | 4.3 | Universities do not have the incentive to produce IPRs. | Tension | Tension |
| 5 | 4.1 | Most innovations are made outside Finland. The national IPR system should make it possible to better utilize foreign innovations in Finland. | Tension | Consensus, negative |
| 6 | 4.3 | Higher education institutions need more practical education and training on IPRs (e.g., practical agreements). | Consensus, positive | Consensus, positive |
| 7 | 4.4 | Copyright law is fragmented and outdated, highlighting the need for overall reform. | Tension | Tension |
| 8 | 4.4 | Concentrating copyright and industrial rights in the same ministry would help improve the coherence and clarify the system. | Tension | Consensus, positive |
| 9 | 4.1 | There is no adequate basic education on IPRs for university students. | Tension | Consensus, positive |
| 10 | 4.3 | Researchers do not have sufficient knowledge of IPRs, and these issues are not included as a mandatory part of researcher training. | Tension | Consensus, positive |
| 11 | 4.4 | Copyright law reforms are complicated by their juxtaposition to other IPRs. | Tension | Tension |
| 12 | 4.1 | The reform of IPR should increasingly aim to include industry-specific weightings (e.g. the extent of protection). | Tension | Tension |
| 13 | 4.1 | IPRs do not sufficiently support innovation in the digital and green economy. For example, more clarity is needed to protect new models. | Tension | Tension |
| 14 | 4.1 | Concentrating on IPR disputes at the Market Court has been a good solution and has helped to increase IPR-related expertise. | Consensus, positive | Consensus, positive |
| 15 | 4.2 | IPR skills have not been sufficiently resourced in the ministries, and this is reflected in a skills gap. | Consensus, positive | Consensus, positive |
| 16 | 4.4 | European copyright legislation (e.g., the EU directive on copyright in the digital single market) is transforming the market in favor of large platforms rather than protecting the creative industry and consumers. | Tension | Tension |
| 17 | 4.3 | To increase research-based patenting and the ability to make economic use of scientific results, researchers should be | Tension | Tension |

(continued on next page)

Table 4 (continued)

| # | Theme | Argument | Round 1 | Round 2 |
|----|-------|--|---------------------|---------|
| 18 | 4.1 | given stronger rights to exploit the results of research. Public awareness and competence in IPR matters is clearly weaker in Finland than in pioneering countries (e.g., the United States or Korea). | Tension | Tension |
| 19 | 4.1 | An IPR box and/or tax incentive would increase the importance of IPRs and encourage the exploitation of IPRs as part of the business model. | Tension | Tension |
| 20 | 4.1 | SMEs are reluctant to take advantage of IPRs, largely because of a lack of information. | Consensus, positive | Tension |
| 21 | 4.1 | Stronger sectoral measures are needed to combat IPR abuses. | Tension | Tension |
| 22 | 4.1 | The patenting process has changed to favor large companies capable of creating large patent portfolios, leaving small- and medium-sized enterprises at a disadvantage. | Tension | Tension |
| 23 | 4.2 | Finland's IPR system (institutions, administration, legal base) is competitive and of high quality and there is no significant need for development. | Tension | Tension |
| 24 | 4.2 | Finland does not have sufficient ambition to influence the development of EU legislation on IPRs. | Tension | Tension |
| 25 | 4.4 | The European digital single market enables the licensing of copyrighted content in the EU economic area in an adequate manner. | Tension | Tension |
| 26 | 4.4 | Sufficient measures have been identified and taken in Finland to make greater use of open source in society. | Tension | Tension |
| 27 | 4.4 | Data can be an important source of revenue for creative industries, but only if the free movement of data is effectively protected by the regulation of IPRs. | Tension | Tension |
| — | — | APMO | 0.689 | 0.709 |

Delphi experts were unable to come to a consensus on who reaps the benefits from the IPR system. Although literature clearly highlights that the IPR system is geared toward the incumbents (Weber and Rohrer, 2012; Zhao, 2006), this does not seem to be a shared view among experts. The experts also disagreed on the role research organizations play in the IPR system. Our findings align with the critique of the IPR system in that it creates centralized industry structures (Wu, 2006) in which actors with smaller resources are not able to participate. This aligns with Giuliani (2018) and the discussion on the national innovation system, where we can increasingly identify the role and influence of large multinational corporations. Although the experts did not agree on many of the fundamentals of the IPR system, the experts found agreement in the need to improve capabilities across the system's stakeholders. As seen in arguments #2, #3, #6, #9, #10, capability building was one of the only issues resulting in broad consensus. However, drawing from Neville and Menguc (2006); Carlisle and Gruby (2019), we argue that broader transitions within the IPR system would require actors to have a shared view on the rules and norms of the system. Our Delphi results highlight that this is not the case. Tensions on the objectives and development areas in the IPR systems were high, and there was little

movement through the anonymous dialogue process toward consensus.

Although policies play a role in improving the NIS and IPRs (Giuliani, 2018), our findings question if we can transition the system in a meaningful way. Through comments on multiple arguments, the experts highlighted that a skills and resources gap in policy-making limits the ability to make broader transformations at the national or international levels. The current IPR regime has issues of coordination and, based on the literature (Durand and Milberg, 2020; Sweet and Eterovic, 2019; Sweet and Maggio, 2015; Hausmann et al., 2014; Acemoglu and Akcigit, 2012), does not contribute to growth because its effectiveness in spurring innovation itself is suspect. This is consistent with the critique of the NIS regarding top-down approaches that result in a lack of autonomy. Autonomy enables communities to try out different rule combinations because of their local knowledge regarding the particular circumstances they face, allowing them to discover a combination of rules that work for them within their contexts (Lewis, 2021; Aligica and Tarko, 2012).

The central justification of IPR has been to support economic growth through innovation (Moser, 2013). The experts in the Delphi process did not explicitly question the growth agenda and the role of IPRs in enabling innovation. This being said, the experts were critical of the path from research to innovation and if the current model of the IPR system works to pave the way toward utilizing research. Although we have a consensus on the role of knowledge and innovation in the economy (Romer, 1990; Acs et al., 2002), the experts questioned the role of knowledge-producing organizations (higher education institutes) in IPR production. Highlighting the lack of skills and motivation and questioning if publicly funded knowledge should be protected with IPRs, the experts did not agree on a path forward.

Where the experts reached a consensus was that capability building would be the path forward. This was the case regarding policy-making, industry, and higher education. Particularly on the inclusivity of the IPR system, the experts noted that participation can be improved if actors are offered the assistance needed to take part in the system. These findings align with previous research. For example, European Commission (2020) highlight the heterogeneity of actors, namely companies, regarding capabilities. Balancing the capability asymmetry in the innovation system can, however, be challenging, but it is essential to ensure knowledge transfer (Mayer and Blaas, 2002). This increases the importance of processes that support access to the system. The experts highlighted how less capable actors are unable to rely on the system to produce fair outcomes in a reasonable time frame. This raises the question regarding if different types of governance models can create a more equitable system where the competitive and cooperative relationship between the IPR system actors is mediated with those processes that enable conflict resolution (Carlisle and Gruby, 2019).

The increasing importance of copyright and IPR protection for the creative industry poses additional challenges, as highlighted by our results. The experts were skeptical if policy-making could transform the IPR system to protect end users and smaller actors, even if this is explicitly the point. The experts also highlighted the challenges of creating rule-based systems that operate beyond national boundaries. The literature has already highlighted how, as data are becoming the main asset of many companies (Tao; Akman, 2019), existing IPR rules may even be losing all relevance (Athreye and Fassio, 2020; Davidson and Potts, 2017). The rights for creative work are also extremely important in the digital era. The creative and digital economy relies on new forms of collaborative modes of production (Kallis et al., 2018; Kostakis and Bauwens, 2014), which ultimately challenge existing, what the experts noted as slow and expensive, processes.

In reflecting on the results of the study, we should note that this was country case study. That being said, Finland is an active participant in the global IPR systems, and as an export-reliant, knowledge-based economy, much relies on forms of protection for intellectual work. The Delphi methodology also relies on the stakeholder selection. Reflecting on the stakeholder salience model, our study was not able to meet all of the criteria for a diverse stakeholder pool. However, the number of

stakeholders and group heterogeneity was still strong. A potential limitation of the approach used was also that we were unable to disaggregate results based on expert group. The approach selected for the study did not allow for this to be done, even though this could have created a more nuanced view of the results. However, central to the Delphi method is that the experts were treated as one group; thus, understanding group differences should be done in a follow-up study (e.g., interview with key group reflecting on our findings). The results are also strengthened by the large participant pool in both rounds, even though it is well known that the Delphi process requires significant effort and time from participants.

Reflecting on our contribution and its limitations, future research can extend this contribution by zooming in on how national IPR strategies can find a balance between private IPR services and public centralized services. Experts from companies tend to believe in private services, but government and higher education institutes believe there is a role for public players. We should also better understand the high tension created by arguments based on scientific findings. Our findings question if science can shape policy if arguments based on research create high tension between stakeholders. Moreover, future research should analyze how IPR strategy can be coordinated between the ministries in charge of research, education, and the economy. Overall, further focus on studying optimal governance models for national IPR strategy is needed.

6. Conclusions

IPRs are and have been a central element in innovation policy.

Appendix

Table 5

Background and references to selected Delphi arguments

| Begin of Table | | | |
|----------------|---|-------------------------------|---|
| # | Delphi argument | Reference | Notes |
| 1 | The main shortcoming of the IPR system is the low level of competence of different organizations. | (MEAE, 2012) | Central finding of the impact evaluation for Finland's 2019 IPR strategy |
| 2 | Small- and medium-sized enterprises lack an overall view of the importance of IPR and intangible assets in their business. | (MEAE, 2012) | Central finding of the impact evaluation for Finland's 2019 IPR strategy |
| 3 | The advice on IPR has been fragmented for various public actors. Finland lacks centralized advice on IPR ("IPR-helpdesk"). | (MEAE, 2012) | Central finding of the impact evaluation for Finland's 2019 IPR strategy |
| 4 | Universities do not have the incentive to produce IPRs. | (Leydesdorff and Meyer, 2010) | Universities' role in the IPR systems |
| 5 | Most innovations are made outside Finland. The national IPR system should make it possible to better "copy" and utilize foreign innovations in Finland. | (Holmström et al., 2014) | The work is critical regarding if a strong IPR system is beneficial for a small open economy like Finland. Important system-level view. |
| 6 | Higher education institutions need more practical education and training on IPRs (e.g., practical agreements). | Stakeholder interviews | Central finding from interviews conducted during the study with key stakeholder groups. |
| 7 | Copyright law is fragmented and outdated, highlighting the need for overall reform. | Stakeholder interviews | Central finding from the interviews conducted during the study with key stakeholder groups. |
| 8 | Concentrating copyright and industrial rights in the same ministry would help improve coherence and clarify the system. | Stakeholder interviews | Central finding from the interviews conducted during the study with key stakeholder groups. |
| 9 | There is no adequate basic education on IPRs for university students. | (MEAE, 2012) | Central finding of the impact evaluation for Finland's 2019 IPR strategy |
| 10 | Researchers do not have sufficient knowledge of IPRs, and these issues are not included as a mandatory part of researcher training. | (MEAE, 2012) | Central finding of the impact evaluation for Finland's 2019 IPR strategy |
| 11 | Copyright law reforms are complicated by their juxtaposition to other IPRs. | (MEAE, 2012) | Central finding of the impact evaluation for Finland's 2019 IPR strategy |
| 12 | The reform of IPR should increasingly aim to include industry-specific weightings (e.g., the extent of protection). | (Hall, 2007) | The research focuses on the importance of understanding sectoral differences important for holistic understanding of the IPR system. |
| 13 | IPRs do not sufficiently support innovation in the digital and green economy. For example, more clarity is needed to protect new models. | (EU, 2020) | Highlighted as a key challenge in the European Union IPR action plan. |
| 14 | Concentrating on IPR disputes at the Market Court has been a good solution and has helped to increase IPR-related expertise. | Stakeholder interviews | Central finding from interviews conducted during the study with key stakeholder groups. |
| 15 | IPR skills have not been sufficiently resourced in the ministries, and this is reflected in a skills gap. | Stakeholder interviews | Central finding from interviews conducted during the study with key stakeholder group |
| 16 | | (Passinke, 2020) | Highlights the changes from digital revolution potentially creating pressure for the IPR system to change. |

(continued on next page)

Geared toward creating economic benefits, namely economic growth, when it comes to IPRs, we have agreed to provide a monopoly to the few for broader economy-wide benefits. With the Finnish government seeking research-based advice to understand the IPR system in a holistic way, this research focused on understanding the multiple vantage points of the innovation systems stakeholders toward IPRs. Our central finding is that there is a significant amount of tension between stakeholders' views on the core elements (benefits and objectives) of the IPR system. The only broad-based consensus was reached on the need to increase the capabilities of stakeholder to working within the IPR system, while tensions were found in the objectives, processes, and outcomes from the system.

The results emphasize the call in the literature to build a more holistic approach that informs stakeholders on what is expected but that also addresses perceived or actual inequalities built into the system. This requires capability building, as agreed by the experts, but we argue for a more polycentric approach that would better incorporate the heterogeneity of system stakeholders and objectives into the IPR system.

Acknowledgements

Finnish Government's analysis, assessment and research activities project Aineettomien oikeuksien tilanne Suomessa 2020: IPR-strategian taustoitus (IPSTRA) (VN/8076/2020).

Data availability

Data will be made available on request.

Table 5 (continued)

| Begin of Table | | | |
|----------------|--|--|--|
| # | Delphi argument | Reference | Notes |
| | European copyright legislation (e.g., the EU directive on copyright in the digital single market) is transforming the market in favor of large platforms rather than protecting the creative industry and consumers. | | |
| 17 | To increase research-based patenting and the ability to make economic use of scientific results, researchers should be given stronger rights to exploit the results of research. | (Ejermo and Toivanen, 2018) | Important because of a recent legislative change that has no received its first ex post evaluations |
| 18 | Public awareness and competence in IPR matters is clearly weaker in Finland than in forerunner countries (e.g., United States or Korea). | Stakeholder interviews | Central finding from interviews conducted during the study with key stakeholder groups. |
| 19 | An IPR box and/or tax incentive would increase the importance of IPRs and encourage the exploitation of IPRs as part of the business model. | Stakeholder interviews | Central finding from interviews conducted during the study with key stakeholder groups. |
| 20 | SMEs are reluctant to take advantage of IPRs, largely because of a lack of information. | (EU, 2020) | Highlighted as a key challenge in the EU IPR action plan. |
| 21 | Stronger sectoral measures are needed to combat IPR abuses. | (EU, 2020) | Highlighted as a key challenge in the EU IPR action plan. |
| 22 | The patenting process has changed to favor large companies capable of creating large patent portfolios, leaving small- and medium-sized enterprises at a disadvantage. | (Blind et al., 2006) | While in the German context, the argument highlights the increased cost of patenting and the increased complexity of technology |
| 23 | Finland's IPR system (institutions, administration, legal base) is competitive and of a high quality, and there is no significant need for development. | International property rights index (IPR-pillar) | Important to aspect to ask as Finland ranks high in the international IPR index % |
| 24 | Finland does not have sufficient ambition to influence the development of EU legislation on IPRs. | Stakeholder interviews | Interviews conducted during the study with key stakeholder groups. |
| 25 | The European digital single market enables the licensing of copyrighted content in the EU economic area in an adequate manner. | (Mazziotti and Simonelli, 2016) | Highlights the changes from the digital revolution potentially creating pressure for the IPR system to adapt to copyright issues. |
| 26 | Sufficient measures have been identified and taken in Finland to make greater use of open source in society. | (August et al., 2018) | Highlights the changes from the digital revolution potentially creating pressure for the IPR system to adapt to open source software. |
| 27 | Data can be an important source of revenue for creative industries but only if the free movement of data is effectively protected by the regulation of IPRs. | (Banterle, 2020) | Highlights the changes from the digital revolution potentially creating pressure for the IPR system to adapt to data economy and copyright issues. % |

Table 6

Aggregated the results from round 2.

| # | Strongly disagree | Somewhat disagree | Neither agree or disagree | Somewhat agree | Strongly agree | Unable to comment | N |
|----|-------------------|-------------------|---------------------------|----------------|----------------|-------------------|----|
| 1 | 2.9% | 23.5% | 5.9% | 61.8% | 5.9% | 0.0% | 34 |
| 2 | 0.0% | 2.9% | 5.9% | 76.5% | 14.7% | 0.0% | 34 |
| 3 | 0.0% | 8.8% | 11.8% | 61.8% | 17.6% | 0.0% | 34 |
| 4 | 0.0% | 17.6% | 23.5% | 26.5% | 14.7% | 17.6% | 34 |
| 5 | 23.5% | 58.8% | 5.9% | 11.8% | 0.0% | 0.0% | 34 |
| 6 | 0.0% | 2.9% | 8.8% | 20.6% | 64.7% | 2.9% | 34 |
| 7 | 2.9% | 8.8% | 20.6% | 32.4% | 2.9% | 32.4% | 34 |
| 8 | 2.9% | 11.4% | 8.6% | 42.9% | 28.6% | 5.7% | 35 |
| 9 | 2.9% | 2.9% | 5.9% | 41.2% | 44.1% | 2.9% | 34 |
| 10 | 0.0% | 14.7% | 0.0% | 52.9% | 23.5% | 8.8% | 34 |
| 11 | 14.3% | 40.0% | 17.1% | 11.4% | 2.9% | 14.3% | 35 |
| 12 | 2.9% | 64.7% | 14.7% | 11.8% | 0.0% | 5.9% | 34 |
| 13 | 11.4% | 57.1% | 17.1% | 14.3% | 0.0% | 0.0% | 35 |
| 14 | 0.0% | 2.9% | 2.9% | 31.4% | 51.4% | 11.4% | 35 |
| 15 | 0.0% | 0.0% | 5.7% | 28.6% | 54.3% | 11.4% | 35 |
| 16 | 8.6% | 17.1% | 37.1% | 0.0% | 5.7% | 31.4% | 35 |
| 17 | 8.8% | 23.5% | 23.5% | 26.5% | 5.9% | 11.8% | 34 |
| 18 | 2.9% | 22.9% | 17.1% | 25.7% | 0.0% | 31.4% | 35 |
| 19 | 2.9% | 20.0% | 17.1% | 37.1% | 5.7% | 17.1% | 35 |
| 20 | 0.0% | 14.7% | 20.6% | 58.8% | 2.9% | 2.9% | 34 |
| 21 | 0.0% | 8.6% | 37.1% | 42.9% | 11.4% | 0.0% | 35 |
| 22 | 0.0% | 23.5% | 35.3% | 35.3% | 0.0% | 5.9% | 34 |
| 23 | 8.8% | 55.9% | 11.8% | 20.6% | 2.9% | 0.0% | 34 |
| 24 | 4.5% | 9.1% | 9.1% | 50.0% | 18.2% | 9.1% | 22 |
| 25 | 0.0% | 11.4% | 31.4% | 11.4% | 0.0% | 45.7% | 35 |
| 26 | 0.0% | 5.7% | 45.7% | 17.1% | 0.0% | 31.4% | 35 |
| 27 | 0.0% | 17.1% | 25.7% | 42.9% | 2.9% | 11.4% | 35 |

References

Acemoglu, D., Akcigit, U., 2012. Intellectual property rights policy, competition and innovation. *J. Eur. Econ. Assoc.* 10, 1–42.

Acemoglu, D., Johnson, S., Robinson, J.A., Yared, P., 2009. Reevaluating the modernization hypothesis. *J. Monetary Econ.* 56, 1043–1058.

Acs, Z.J., Anselin, L., Varga, A., 2002. Patents and innovation counts as measures of regional production of new knowledge. *Res. Pol.* 31, 1069–1085.

Agrawal, A.K., 2001. University-to-industry knowledge transfer: literature review and unanswered questions. *Int. J. Manag. Rev.* 3, 285–302.

Akman, P., 2019. Competition Policy in a Globalized, Digitalized Economy. World Economic Forum, Geneva.

Aligica, P.D., Tarko, V., 2012. Polycentricity: from polanyi to ostrom, and beyond. *Governance* 25, 237–262.

Allen, R.C., 1983. Collective invention. *J. Econ. Behav. Organ.* 4, 1–24.

- Andersen, B., Konzelmann, S., 2008. In search of a useful theory of the productive potential of intellectual property rights. *Res. Pol.* 37, 12–28.
- Arrow, K., 1962. Economic welfare and the allocation of resources for innovation. *Rate and Direct. Invent. Act.* 609–626.
- Athreye, S., Fassio, C., 2020. Why do innovators not apply for trademarks? the role of information asymmetries and collaborative innovation. *Ind. Innovat.* 27, 134–154.
- August, T., Shin, H., Tunca, T.I., 2018. Generating value through open source: software service market regulation and licensing policy. *Inf. Syst. Res.* 29, 186–205.
- Baker, D., Jayadev, A., Stiglitz, J.E., 2017. Innovation, Intellectual Property, and Development: A Better Set of Approaches for the 21st Century.
- Banterle, F., 2020. Data ownership in the data economy: a European dilemma. In: *EU Internet Law in the Digital Era*. Springer, pp. 199–225.
- Berg, A., Hukkinen, J.I., 2011. The paradox of growth critique: narrative analysis of the Finnish sustainable consumption and production debate. *Ecol. Econ.* 72, 151–160.
- Blind, K., Edler, J., Frietsch, R., Schmoch, U., 2006. Motives to patent: empirical evidence from Germany. *Res. Pol.* 35, 655–672.
- Boldrin, M., Levine, D.K., 2009. Market size and intellectual property protection. *Int. Econ. Rev.* 50, 855–881.
- Boldrin, M., Levine, D.K., 2013. The case against patents. *J. Econ. Perspect.* 27, 3–22.
- Box, S., 2009. *Oecd Work on Innovation—A Stocktaking of Existing Work*.
- Bradfield, R., Wright, G., Burt, G., Cairns, G., Van Der Heijden, K., 2005. The origins and evolution of scenario techniques in long range business planning. *Futures* 37, 795–812.
- Buchanan, J.M., Yoon, Y.J., 2000. Symmetric tragedies: commons and anticommons. *J. Law Econ.* 43, 1–14.
- Carlisle, K., Gruby, R.L., 2019. Polycentric systems of governance: a theoretical model for the commons. *Pol. Stud. J.* 47, 927–952.
- Cho, K., Kim, C., Shin, J., 2015. Differential effects of intellectual property rights on innovation and economic performance: a cross-industry investigation. *Sci. Publ. Pol.* 42, 827–840.
- Cimoli, M., Dosi, G., Maskus, K.E., Okediji, R.L., Reichman, J.H., Stiglitz, J.E., 2014. *Intellectual Property Rights: Legal and Economic Challenges for Development*. Oxford University Press.
- Clarke, T., 2001. *The Knowledge Economy. Education+ Training*.
- Cohen, W.M., Nelson, R.R., Walsh, J.P., 2000. Protecting Their Intellectual Assets: Appropriability Conditions and Why US Manufacturing Firms Patent (Or Not). National Bureau of Economic Research.
- da Silveira Junior, L.A.B., Vasconcelos, E., Guedes, L.V., Guedes, L.F.A., Costa, R.M., 2018. Technology roadmapping: a methodological proposition to refine delphi results. *Technol. Forecast. Soc. Change* 126, 194–206.
- Daim, T.U., Li, X., Kim, J., Simms, S., 2012. Evaluation of energy storage technologies for integration with renewable electricity: quantifying expert opinions. *Environ. Innov. Soc. Transit.* 3, 29–49.
- Dalkey, N.C., 1967. *Delphi. Technical Report*. Rand Corp Santa Monica CA.
- Dalkey, N., Helmer, O., 1963. An experimental application of the delphi method to the use of experts. *Manag. Sci.* 9, 458–467.
- Davidson, S., Potts, J., 2016. The social costs of innovation policy. *Econ. Aff.* 36, 282–293.
- Davidson, S., Potts, J., 2017. The stationary bandit model of intellectual property. *Cato J.* 37, 69.
- De Beer, J., 2016. Evidence-based intellectual property policymaking: an integrated review of methods and conclusions. *J. World Intellect. Property* 19, 150–177.
- Devaney, L., Henchion, M., 2018. Who is a delphi ‘expert’? reflections on a bioeconomy expert selection procedure from Ireland. *Futures* 99, 45–55.
- Dosi, G., Marengo, L., Pasquali, C., 2006a. How much should society fuel the greed of innovators?: on the relations between appropriability, opportunities and rates of innovation. *Res. Pol.* 35, 1110–1121.
- Dosi, G., Marengo, L., Pasquali, C., 2006b. Knowledge, competition and the innovation: is stronger ipr protection really needed for more and better innovations. *Mich. Telecommun. Technol. Law Rev.* 13, 471.
- Durand, C., Milberg, W., 2020. Intellectual monopoly in global value chains. *Rev. Int. Polit. Econ.* 27, 404–429.
- Edquist, C., 2013. *Systems of Innovation: Technologies, Institutions and Organizations*. Routledge.
- Efstathiou, N., Ameen, J., Coll, A.M., 2007. Healthcare providers’ priorities for cancer care: a delphi study in Greece. *Eur. J. Oncol. Nurs.* 11, 141–150.
- Ejermo, O., Toivanen, H., 2018. University invention and the abolishment of the professor’s privilege in Finland. *Res. Pol.* 47, 814–825.
- EU, 2020. Making the Most of the EU’s Innovative Potential an Intellectual Property Action Plan to Support the EU’s Recovery and Resilience, Communication from the European Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. ‘European Commission’ (COM/2020/760). Technical Report.
- European Commission, E., 2020. Making the Most of the EU’s Innovative Potential – an Intellectual Property Action Plan to Support the EU’s Recovery and Resilience. ‘COMMUNICATION from the COMMISSION to the EUROPEAN PARLIAMENT, THE COUNCIL, THE EUROPEAN ECONOMIC AND SOCIAL COMMITTEE AND THE COMMITTEE OF THE REGIONS’.
- Ferroni, M., 1998. *World Development Report 1998-knowledge for Development*. The World Bank.
- Freeman, C., Soete, L., 1997. *The Economics of Industrial Innovation*. Routledge, London.
- Freeman, C., Clark, J., Soete, L., 1982. Unemployment and Technical Innovation: a Study of Long Waves and Economic Development, vol. 50. Greenwood Press, Westport, Conn.
- Frischmann, B.M., Madison, M.J., Strandburg, K.J., 2014. *Governing Knowledge Commons*. Oxford University Press.
- Fu, X., Pietrobelli, C., Soete, L., 2011. The role of foreign technology and indigenous innovation in the emerging economies: technological change and catching-up. *World Dev.* 39, 1204–1212.
- Ge, S., Liu, X., 2021. The Role of Knowledge Creation, Absorption and Acquisition in Determining National Competitive Advantage. *Technovation*, 102396.
- Giuliani, E., 2018. Regulating global capitalism amid rampant corporate wrongdoing—reply to “three frames for innovation policy”. *Res. Pol.* 47, 1577–1582.
- Glass, A.J., Saggi, K., 2002. Intellectual property rights and foreign direct investment. *J. Int. Econ.* 56, 387–410.
- Goel, R.K., Saunoris, J.W., 2020. Where is the entrepreneurship bang for the patenting buck? utility versus design patents. *Manag. Decis. Econ.* 41, 25–35.
- Gold, E.R., Morin, J.F., Shadede, E., 2019. Does intellectual property lead to economic growth? insights from a novel ip dataset. *Regul. Gov.* 13, 107–124.
- Grossman, G.M., Helpman, E., 1991. Trade, knowledge spillovers, and growth. *Eur. Econ. Rev.* 35, 517–526.
- Hadad, S., et al., 2017. Knowledge economy: characteristics and dimensions. *Manag. dyn. Knowl. econ.* 5, 203–225.
- Hall, B.H., 2007. Patents and patent policy. *Oxf. Rev. Econ. Pol.* 23, 568–587.
- Hausmann, R., Hidalgo, C.A., Bustos, S., Coscia, M., Simoes, A., 2014. *The Atlas of Economic Complexity: Mapping Paths to Prosperity*. MIT Press.
- Heller, M.A., 1998. The tragedy of the anticommons: property in the transition from marx to markets. *Harv. Law Rev.* 621–688.
- Helpman, E., 1992. *Innovation, Imitation, and Intellectual Property Rights*. National bureau of economic research Cambridge, Mass., USA.
- Henry, C., Stiglitz, J.E., 2010. Intellectual property, dissemination of innovation and sustainable development. *Glob. Pol.* 1, 237–251.
- Hess, C., Ostrom, E., 2003. Ideas, artifacts, and facilities: information as a common-pool resource. *Law Contemp. Probl.* 66, 111–145.
- Hess, C., Ostrom, E., 2005. A Framework for Analyzing the Knowledge Commons: a Chapter from Understanding Knowledge as a Commons: from Theory to Practice.
- Holmström, B., Korkman, S., Pohjola, M., 2014. Suomen talouskriisin luonne ja kasvun edellytykset. *Valtioneuvoston kanslia, Helsinki*, pp. 6–8. Available at: <http://vnk.fi/hankkeet/talousneuvosto/julkaisut/holmstrom-korkman-pohjola-25022014/fi.pdf>.
- Hussler, C., Picard, F., Tang, M.F., 2010. Taking the ivory from the tower to coat the economic world: regional strategies to make science useful. *Technovation* 30, 508–518.
- Imperial, M.T., 1999. Institutional analysis and ecosystem-based management: the institutional analysis and development framework. *Environ. Manag.* 24, 449–465.
- Jackson, T., 2009. *Prosperity without Growth: Economics for a Finite Planet*. Routledge.
- Jaffe, A.B., Lerner, J., 2011. *Innovation and its Discontents: How Our Broken Patent System Is Endangering Innovation and Progress, and what to Do about it*. Princeton University Press.
- Kallis, G., Kostakis, V., Lange, S., Muraca, B., Paulson, S., Schmelzer, M., 2018. Research on degrowth. *Annu. Rev. Environ. Resour.* 43, 291–316.
- Kapoor, P., 1987. *Systems Approach to Documentary Maritime Fraud*.
- Khan, B.Z., 2005. *The Democratization of Invention: Patents and Copyrights in American Economic Development, 1790-1920*. Cambridge University Press.
- Khan, B.Z., Sokoloff, K.L., 1993. Schemes of practical utility”: entrepreneurship and innovation among “great inventors” in the United States, 1790–1865. *J. Econ. Hist.* 53, 289–307.
- Kochenkova, A., Grimaldi, R., Munari, F., 2016. Public policy measures in support of knowledge transfer activities: a review of academic literature. *J. Technol. Tran.* 41, 407–429.
- Kostakis, V., Bauwens, M., 2014. *Network Society and Future Scenarios for a Collaborative Economy*. Springer.
- Landes, D.S., 2003. *The Unbound Prometheus: Technological Change and Industrial Development in Western Europe from 1750 to the Present*. Cambridge University Press.
- Laplume, A.O., Pathak, S., Xavier-Oliveira, E., 2014. The politics of intellectual property rights regimes: an empirical study of new technology use in entrepreneurship. *Technovation* 34, 807–816.
- Lerner, J., Tirole, J., 2005. The economics of technology sharing: open source and beyond. *J. Econ. Perspect.* 19, 99–120.
- Levin, R.C., Klevorick, A.K., Nelson, R.R., Winter, S.G., Gilbert, R., Griliches, Z., 1987. Appropriating the returns from industrial research and development. *Brookings Pap. Econ. Activ.* 1987, 783–831.
- Lewis, P., 2021. The innovation systems approach: an austrian and ostromian perspective. *Rev. Austrian Econ.* 34, 97–114.
- Leydesdorff, L., Meyer, M., 2010. The decline of university patenting and the end of the bayh-dole effect. *Scientometrics* 83, 355–362.
- Lucas Jr., R.E., 1988. On the mechanics of economic development. *J. Monetary Econ.* 22, 3–42.
- Lundvall, B.A., 1992. *National Systems of Innovation - towards a Theory of Innovation and Interactive Learning*. Pinter Publishers, London.
- Madison, M., Frischmann, B., Strandburg, K., 2009. The university as a constructed cultural commons. *J. Law Pol.* 30, 365–403.
- Madison, M., Strandburg, K., Frischmann, B., 2016. Knowledge commons. In: Menell, P., Schwartz, D. (Eds.), *Research Handbook on the Economics of Intellectual Property Law*, ume II. Edward Elgar, Cheltenham.
- Marshall, G., 2015. Polycentricity and adaptive governance. In: *Working Paper Presented at the 15th Biannual International Conference of the International Association for the Study of the Commons* (Edmonton, Canada).

- Martin, S., Scott, J., 2000. The nature of innovation market failure and the design of public support for private innovation. *Res. Pol.* 29, 437–447.
- Mayer, S., Blaas, W., 2002. Technology transfer: an opportunity for small open economies. *J. Technol. Tran.* 27, 275–289.
- Mazziotti, G., Simonelli, F., 2016. Another Breach in the Wall: Copyright Territoriality in Europe and its Progressive Erosion on the Grounds of Competition Law. info.
- Mazzucato, M., 2018. *Entrepreneurial State: Debunking Public vs. Private Sector Myths*. Penguin Books.
- McGinnis, M., Ostrom, E., 2012. Reflections on Vincent Ostrom, public administration, and polycentricity. *Publ. Adm. Rev.* 72, 15–25.
- MEAE, 2012. MEAE Reports 1/2012 IPR-Strategy Evaluation (In Finnish TEM Raportteja 1/2012 IPR-Strategian Arvioinnista). The Ministry of Economic Affairs and Employment. Technical Report.
- Miettinen, R., 2002. *National Innovation System: Scientific Concept or Political Rhetoric*. Edita.
- Mitchell, R.K., Agle, B.R., Wood, D.J., 1997. Toward a theory of stakeholder identification and salience: defining the principle of who and what really counts. *Acad. Manag. Rev.* 22, 853–886.
- Mokyr, J., 2010. *The Enlightened Economy: An Economic History of Britain 1700–1850*. Yale University Press.
- Moser, P., 2005. How do patent laws influence innovation? evidence from nineteenth-century world's fairs. *Am. Econ. Rev.* 95, 1214–1236.
- Moser, P., 2011. Do patents weaken the localization of innovations? evidence from world's fairs. *J. Econ. Hist.* 363–382.
- Moser, P., 2012. Innovation without patents: evidence from world's fairs. *J. Law Econ.* 55, 43–74.
- Moser, P., 2013. Patents and innovation: evidence from economic history. *J. Econ. Perspect.* 27, 23–44.
- Nelson, R., 1959. The simple economics of basic scientific research. *J. Polit. Econ.* 67, 296–307.
- Nelson, R. (Ed.), 1993. *National Innovation Systems: a Comparative Analysis*. Oxford University Press on Demand.
- Neville, B.A., Menguc, B., 2006. Stakeholder multiplicity: toward an understanding of the interactions between stakeholders. *J. Bus. Ethics* 66, 377–391.
- Neville, B.A., Bell, S.J., Whitwell, G.J., 2011. Stakeholder salience revisited: refining, redefining, and refueling an underdeveloped conceptual tool. *J. Bus. Ethics* 102, 357–378.
- Nuvolari, A., 2004. Collective invention during the british industrial revolution: the case of the Cornish pumping engine. *Camb. J. Econ.* 28, 347–363.
- Oliver, C., 1991. Strategic responses to institutional processes. *Acad. Manag. Rev.* 16, 145–179.
- Ostrom, E., 1999a. Coping with tragedies of the commons. *Annu. Rev. Polit. Sci.* 2, 493–535.
- Ostrom, V., 1999b. Polycentricity. In: McGinnis, M.D. (Ed.), *Polycentricity and Local Public Economies: Readings from the Workshop in Political Theory and Policy Analysis*. The University of Michigan Press, Ann Arbor, MI, pp. 52–74.
- Ostrom, V., Tiebout, C., Warren, R., 1961. The organization of government in metropolitan areas: a theoretical inquiry. *Am. Polit. Sci. Rev.* 55, 831–842.
- O’Kane, C., Cunningham, J.A., Menter, M., Walton, S., 2021. The brokering role of technology transfer offices within entrepreneurial ecosystems: an investigation of macro-meso-micro factors. *J. Technol. Tran.* 46, 1814–1844.
- Passinke, D., 2020. An Analysis of Articles 15 and 17 of the Eu Directive on Copyright in the Digital Single Market: A Boost for the Creative Industries or the Death of the Internet? *Stanford-Vienna Transatlantic Technology Law Forum-European Union Law*.
- Piketty, T., . About capital in the twenty-first century. *Am. Econ. Rev.* 105, 48–53.
- Potts, J., 2018. Governing the innovation commons. *J. Inst. Econ.* 14, 1025–1047.
- Rodrik, D., . *Straight Talk on Trade: Ideas for a Sane World Economy*. Princeton University Press.
- Romer, P.M., 1990. Endogenous technological change. *J. Polit. Econ.* 98, S71–S102.
- Schot, J., Steinmueller, W.E., 2018. Three frames for innovation policy: R&D, systems of innovation and transformative change. *Res. Pol.* 47, 1554–1567.
- Schumpeter, J., 1934. *The Theory of Economic Development: an Inquiry into Profits, Capital, Credit, Interest, and the Business Cycle*, vol. 55. Transaction Publishers.
- Sen, A., . *The Idea of Justice*. Harvard University Press.
- Steinert, M., 2009. A dissensus based online delphi approach: an explorative research tool. *Technol. Forecast. Soc. Change* 76, 291–300.
- Stiglitz, J., 2007. *Making Globalization Work*. WW Norton & Company.
- Suominen, A., Tuominen, A., Kantola, J., 2011. Analyzing prospects of portable fuel cells with an expert opinion study. *Futures* 43, 513–524.
- Sweet, C., Eterovic, D., 2019. Do patent rights matter? 40 years of innovation, complexity and productivity. *World Dev.* 115, 78–93.
- Sweet, C.M., Maggio, D.S.E., 2015. Do stronger intellectual property rights increase innovation? *World Dev.* 66, 665–677.
- Tao, M., . Frand to address competition issues posed by major digital platforms? *Eur. Compet. J.* 16, 595–612.
- Tao, M.H., 2020. Frand to address competition issues posed by major digital platforms? *Eur. Compet. J.* 16, 595–612.
- Tapio, P., Paloniemi, R., Varho, V., Vinnari, M., 2011. The unholy marriage? integrating qualitative and quantitative information in delphi processes. *Technol. Forecast. Soc. Change* 78, 1616–1628.
- Thomson, R., 2009. *Structures of Change in the Mechanical Age: Technological Innovation in the United States, 1790–1865*. JHU Press.
- Varho, V., Tapio, P., 2013. Combining the qualitative and quantitative with the q2 scenario technique—the case of transport and climate. *Technol. Forecast. Soc. Change* 80, 611–630.
- Veenstra, G.L., Ahaus, K., Welker, G.A., Heineman, E., van der Laan, M.J., Muntinghe, F. L., 2017. Rethinking clinical governance: healthcare professionals’ views: a delphi study. *BMJ Open* 7.
- Weber, K., 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. *Res. Pol.* 41, 1037–1047.
- Woo, S., Jang, P., Kim, Y., 2015. Effects of intellectual property rights and patented knowledge in innovation and industry value added: a multinational empirical analysis of different industries. *Technovation* 43, 49–63.
- Wu, T., 2006. Intellectual property, innovation, and decentralized decisions. *Va. Law Rev.* 92, 123.
- Zhao, M., 2006. Conducting r&d in countries with weak intellectual property rights protection. *Manag. Sci.* 52, 1185–1199.