

Grasping the palpable: critical appraisal of the role of public policy for intangibles

Sarada Devi Gadepalli^{1,*} , Jakob Edler^{1,2} , Joseph Lampel¹

¹Manchester Institute of Innovation Research, Alliance Manchester Business School, The University of Manchester, Booth St W, Manchester M15 6PB, United Kingdom

²Fraunhofer Institute for Systems and Innovation Research ISI, Breslauer Strasse 48, Karlsruhe 76139, Germany

*Corresponding author. Manchester Institute of Innovation Research, Alliance Manchester Business School, The University of Manchester, Booth St W, Manchester M15 6PB, United Kingdom. E-mail: sarada.gadepalli@manchester.ac.uk

Intangibles assets have long been an important component of the global economic systems. Although there are a number of policies to support the build-up and use of different components of intangible assets, policies for intangibles as a whole are often missing. On the one hand, intangible assets often play a central role in gaining competitive advantage. On the other hand, from a systemic point of view, individual ownership of intangible assets can limit the sharing and exchange of intangibles that is indispensable for what we call in this paper ‘*intangibles commons*’. Policy makers must balance the tensions between supporting firm-specific intangibles and ensuring growing ‘*intangibles commons*’. This paper conceptualizes the ‘*intangible commons*’ and subsequently explores the tensions arising, examines the gaps in our knowledge needed for effective policy making and presents a set of recommendations as to more appropriate policy making for intangibles.

Keywords: intangibles; policies; firm-specific intangibles; *intangibles commons*; tensions.

1. Introduction

Intangible assets (IA) have long been an important component of the global economic systems, and have become more and more important in recent decades (Corrado et al. 2018). Consequently, there are numerous policies to support the build-up and use of intangibles (Malcomson et al. 2003; Mason and Brown 2013; Edler et al. 2015; OECD 2019). However, in this article, we argue that those policies are insufficient, and that this insufficiency is mainly due to a neglect of an inherent duality in the characteristics of intangibles that presents important challenges to policy making. On the one hand, IA often play a central role in gaining competitive advantage (Tece 1998). On the other hand, from a systemic point of view, individual ownership of IA can limit the sharing and exchange of intangibles (Hurmelinna et al. 2007, 2008) that is indispensable for what we call in this paper *intangibles-commons*. Therefore, this paper conceptualizes the *intangibles-commons* and subsequently explores the tensions arising, examines the gaps in our knowledge needed for effective policy making, and presents a set of recommendations as to more appropriate policy making for intangibles.

IA are the collective term given to non-physical and non-financial resources. Beyond this basic characterisation, there is no consensus as to the precise definition and delineation of intangibles (Edvinsson 1997; Corrado et al. 2005). Intangibles are often conceived primarily in terms of knowledge and organisational skills giving rise to major intangible categories such as intellectual capital (Edvinsson 1997; Nahapiet and Ghoshal 1998), ‘knowledge assets’ (Grant 1996; Bontis 2001), and organisational capital (Bounfour 2009). Authors also refer to intangibles such R&D, design and computerized information (Corrado et al. 2005), firm-specific human capital, social capital (Nahapiet and Ghoshal 1998), customer loyalty (Zhang et al. 2016), and reputation (Rindova et al. 2010). We

define intangibles as the non-physical and non-financial assets created by foregoing current consumption to achieve output in the future, whose deployment, transformation, and exchange in markets is dependent on the media of storage.

While a vast empirical literature has demonstrated that intangibles have always had enormous economic effects, and those effects are growing (Fukao et al. 2009; Haskel and Westlake 2017; Edquist et al. 2019; Roth 2020), there is a growing recognition of the problem of underinvestment in intangibles due to their scalability, partial-excludability, non-rivalrous, spillovers, and low-residual value characteristics (Morikawa 2015; Demmou et al. 2020). It has fed into policy making in OECD countries, where encouraging investment and working to grow intangibles have become a feature of policy making (Thum-Thysen et al. 2017). However, with this paper, we want to offer a conceptualisation of policies for intangibles and their tensions in order to support policy making. We are convinced that we fill a gap based on two major starting observations. First, it is one basic premise of this paper that policies for intangibles as a category are as yet ill-defined, and this paper wants to offer a conceptualisation of policies for intangibles and their tensions in order to support policy making.

We start from the observation that complexities stemming from the ill-defined, idiosyncratic characteristics of intangibles are not reflected in policy designs and documents. Policy approaches and their justifications often do not recognize the diversity of the mechanisms through which intangibles influence innovation and productivity growth (Awano et al. 2010; Crouzet et al. 2022). It appears, further, that policy measures are not based on a recognition of the interdependencies and trade-offs inherent in the policies required to develop intangibles (Thum-Thysen et al. 2017; Chiapini et al. 2018). Therefore, while numerous policies have emerged that focus

on individual intangibles in areas such as training and skills, R&D and intellectual property (IP) (Dar 2004; Edler et al. 2015; Chiapini et al. 2018), there is far less effort devoted to coordinating these policies.

A second starting point has to do with the recognition that policy making for intangibles faces two major challenges which combine into a policy dilemma. Those challenges have as yet not systematically been conceptualized with a view to policy. First, there are limitations as to how policy can influence how firms internalize, build up, and use different kinds of intangibles (Green and Hogarth 2016). A number of intangibles within firms cannot be influenced directly by policy or the policy influence is very limited. The often cited limited risk-taking in countries like Germany as compared to UK or US would be an example of a very limited policy leverage to influence the intangible entrepreneurial spirit, which seems to be a manifestation of certain cultural traits in countries and within firms (Fuerlinger et al. 2015). Of course, the kinds of limitations shift constantly, as certain intangibles take on different levels of importance, as markets and technologies change and as the expectation of society changes as relates working conditions in firms.

A second key obstacle to developing policies that coordinate the build-up and use of intangibles is the tension between how intangibles are created and managed at the firm level, and the important role they perform as common resources at the regional, national, and international levels. Thus, while policy makers are intent on assisting firms in the key strategic area of acquiring and controlling IA (Menell 2019), at the same time, from a systemic point of view, policy makers must contend with the fact that individual ownership of IA can limit the sharing and exchange of intangibles (Murray and Stern 2007). This duality in the nature of intangibles can be categorized at the firm level as firm-specific-intangibles and at the level of regional and national level as *intangibles-commons*.

As a result of those two obstacles, policy makers are faced with a dilemma. Firms may appropriate sufficient value from their intangibles to cover costs and obtain adequate returns, but they are usually unable to prevent spillovers that allow other firms to benefit from their investments (Teece 2006). Firms therefore press governments to strengthen appropriability regimes (Patry 1997; Boldrin and Levine 2013). However, while firms may press policy makers to legislate for complete appropriation that excludes other firms from benefiting from their investments in intangibles, this may be counterproductive not only for the economy as a whole—but in the long-run for the firms that advocate such policy as well (Nelson 2004). This is because there is a strong interdependence between the firm's ability to build up its stock of intangibles and sufficiently endowed *intangibles-commons*. To craft policies that grow intangibles, policy makers must balance the tensions between supporting firm-specific-intangibles and ensuring growing *intangibles-commons*. In addition, this dilemma is confounded by the fact that across the breadth of intangibles we still face an issue of operationalisation and measurement at the sectoral and firm level (Crouzet and Eberly 2019).

Finally, recent developments regarding the role of the state to support the generation of innovation and knowledge in the context of societal challenges, socio-technical transitions, and missions have further implications for the tensions concerning intangible assets (Janssen et al. 2023; Larrue 2021, Edler et al. 2024). Here, the claim of the state, that is to support innovation and innovation diffusion in certain desired

directions in order to achieve defined missions and even socio-technical transitions. Thus, the dilemma becomes stronger, as rapid diffusion, sharing and co-generating of solutions and knowledge, having access to new practices and technologies are becoming even more important. This is not to say either that the market with its appropriation regime or the intangible commons are better equipped as such¹. But any ambitious policy of the state that mobilizes innovation for societal purposes will have to be even more careful about the role and incentive structure as regards intangible assets. Against this background of (1) ill-defined and understood policy and (2) inherent tensions and a related, potentially growing policy dilemma, this paper has three aims. First, it seeks to differentiate and explore the two types of intangibles and the role of policies for their development. Second, it outlines major policy tensions when it comes to the interplay of those two types of intangibles. To our knowledge, this systematic tension has not been conceptualized with a view to policy. Third, it addresses existing gaps both in terms of our knowledge on intangibles and policy and in terms of policy itself.

Our paper is based on a meta-narrative review of the literature on intangibles (Greenhalgh et al. 2005). Our starting point was a list of keywords using the taxonomy of policy instruments developed by Edler and Fagerberg (2017) and other widely used terminology for IA. We conducted a structured search for literature in each of the journals in the category 'Public Sector and Health Care' from the Association of Business Schools' *Academic Journal Guide* (2015). We searched the abstracts of the journals using various combinations of the keywords. We also conducted a similar exercise using the search function in EBSCO research databases. We then used snowballing technique by going through the literature that cited the papers in the search results as well as the key literature that was cited in the search results. Finally, we used Google search to download significant reports by organisations such as OECD to examine the policy discussions in the grey literature. The search process resulted in our examining more than 66 journals, 111 relevant articles, and 13 practitioner reports. The results of the literature review of policies for intangibles are available upon request. We stress that while we have examined the literature on policies and the policy landscape comprehensively, we do not seek to give a full review on current policies. Rather, we have captured the existing knowledge on IA polices and, on that basis, we have looked carefully for *tensions* in existing policies and comprehensively searched for policies that explicitly address the tensions and/or are holistic. Here, as we will show, the policies for intangibles are imbalanced.

Our paper is structured as follows. In the subsequent section we explore in more detail the firm-specific-intangibles and *intangibles-commons*, with some focus on the sources for the growth of various intangibles. In Section 3 we then discuss the major policy tensions that arise from the interplay of

¹ In the context of developing countries and technology diffusion for sustainable transitions and economic development, the debate around commons versus appropriation is a long-standing issue, with some arguing for legal protection as a pre-conditions for the selling of technologies to the Global South, while others see appropriation as main obstacles rather than drivers of global diffusion of technologies. Global co-creation or co-ownership of IP for critical technologies or flexible forms of IPR such as Technology Transfer pool banks are called for (Gupta et al. 2023). However, the focus on the legal protection of technologies fails to recognise that both for economic development and diffusion a range of local conditions are needed for absorption and adaptation of those technologies to local contexts (Ockwell et al. 2010).

intangibles-commons and firm-specific-intangibles. Section 4 then discusses the intelligence gaps we still face when it comes to understanding and measuring intangibles, which need to be addressed for a comprehensive approach to policy making on intangibles to be achieved. On that basis, Section 5 summarizes the major policy gaps that still exist both for intangibles as a category and for the two types of intangibles. In a last section we briefly zoom out again to draw wider conclusions as to how intangibles should be understood, analysed, and supported in the future.

2. Firm-specific-intangibles versus the *intangibles-commons*: Types, sources, and policies

As intangibles have become more central to the economy, policy makers have become increasingly concerned that underinvestment in intangibles can stall higher productivity and prevent innovations needed to develop new industries (Morikawa 2015; Demmou et al. 2020). Devising policies for intangibles that span the firm as a site for the production and use of intangibles and the supply of intangibles for the economic system as a whole is challenging. There is a duality to the characteristics of intangibles wherein, they can be highly inimitable due to their tacit nature and highly imitable depending on the storage characteristic and availability of complementary assets (Crouzet et al. 2022). To fully appreciate the challenge, we first classify intangibles along two dimensions: the degree to which their benefit can be appropriated by firms, in which case they can be described as firm-specific-intangibles, and the extent to which they are part of a pool of intangibles that is available to all in the *intangibles-commons*.

Firm-specific intangibles are assets or investments which yield rents that can be appropriated by the firm. Firms use a variety of mechanisms to develop intangibles, paying particular attention to designing mechanisms that ensure appropriation of the benefits (Giachetti et al. 2017) generated by the intangibles. In contrast, *intangibles-commons* is the aggregation of tacit and explicit knowledge, skills, and competencies related to a certain technology or industry (Pisano and Shih 2009).

We want to stress that our discussion of policies is somewhat stylized. Clearly, many policies we mention will have implications both on the appropriation and on the commons dimension. However, mostly they are targeted clearly to support either, rather than both, of the underlying rationales. And insofar as policies have strong implications for both rationales they are mentioned accordingly.

2.1 Firm-specific-intangibles

Intangibles can confer strategic advantages. Certain types of intangibles such as organisation structures, business models, and brands are often difficult to reverse-engineer because of time compression diseconomies (Dierickx and Cool 1989). They cannot be easily separated from the firm that owns them, and the synergies between different dimensions of intangibles such as business models and managerial know-how and other tangible assets are difficult to imitate. They are often said to possess the valuable, rare, inimitable, and non-substitutable characteristics that result in competitive advantages for the firm (Barney 1991). We term these assets or investments

whose rents can be appropriated predominantly by the firm as firm-specific-intangibles.

Appropriation is the primary mechanism through which certain intangibles become firm-specific-intangibles. Appropriation is said to occur when the value generated through the use of an asset or investment is retained primarily by the firm, instead of competitors, suppliers, customers, employees, or other stakeholders (Bowman and Ambrosini 2000, 2010). Important enabling conditions for appropriation include the presence of a favourable appropriability regime (the efficacy of legal instruments to protect the firm's property rights and the extent to which the intangible cannot be codified), storage media, availability of complementary assets, extent of firm's control over the dominant design, and the bargaining power over stakeholders (Teece 1986; Bowman and Ambrosini 2000, 2010; Crouzet et al. 2022). See Fig. 1 for a concise overview of the growth pathways through for firm-specific intangibles and policies that support their growth.

2.2 Intangibles-commons

In contrast to the firm-specific-intangibles, *intangibles-commons* are available to all social and economic actors. *Intangibles-commons* is the aggregation of tacit and explicit knowledge, skills, and competencies related to a certain technology or industry. They are quasi-public goods that result both from public policy investments and from spillovers from the activities of firms to other firms and organisations. Firms contribute voluntarily and involuntarily to intangibles that enlarge the *intangibles-commons*, through knowledge spillovers and other similar mechanisms such as joint ventures and consortia (Bernal, Carree & Lokshin, 2022; Davis and Aggarwal 2020; Friedmann et al. 2024). Individuals in their roles as inventors and customers, not-for-profit agencies, and public agencies also contribute to the *intangibles-commons* (Asheim et al. 2011; Koch and Simmler 2020).

Spillovers are the primary mechanism through which the *intangibles-commons* takes shape. Spillovers represent incomplete appropriation. Firms are incentivized to invest in innovation capabilities by expectations of appropriation, expectations that are often based on the appropriation policies of the country in which they are located (Caballero and Jaffe 1993; Aghion and Jaravel 2015; Veer et al. 2016).

See Fig. 1 for a concise overview of the growth pathways through for *intangibles commons* (IC) and policies that support their growth.

3. Potential pitfalls for policymakers

3.1 Contradictory demands as source for tensions

Policies for intangibles are complex to conceptualize and difficult to implement because of the interdependence between firm-specific-intangibles and *intangibles-commons*. Although firms would like to completely internalize the benefits of their intangible investments (Teece 2006), growth of intangibles within firm boundaries is strongly dependent on intangibles that exist outside the boundaries of the firm (Koch and Simmler 2020). The characteristics of intangibles also place contradictory demands on policy-makers (See Gadepalli et al., 2024 for a more detailed analysis). Tacitness limits the extent to which the intangible asset can grow beyond the boundaries

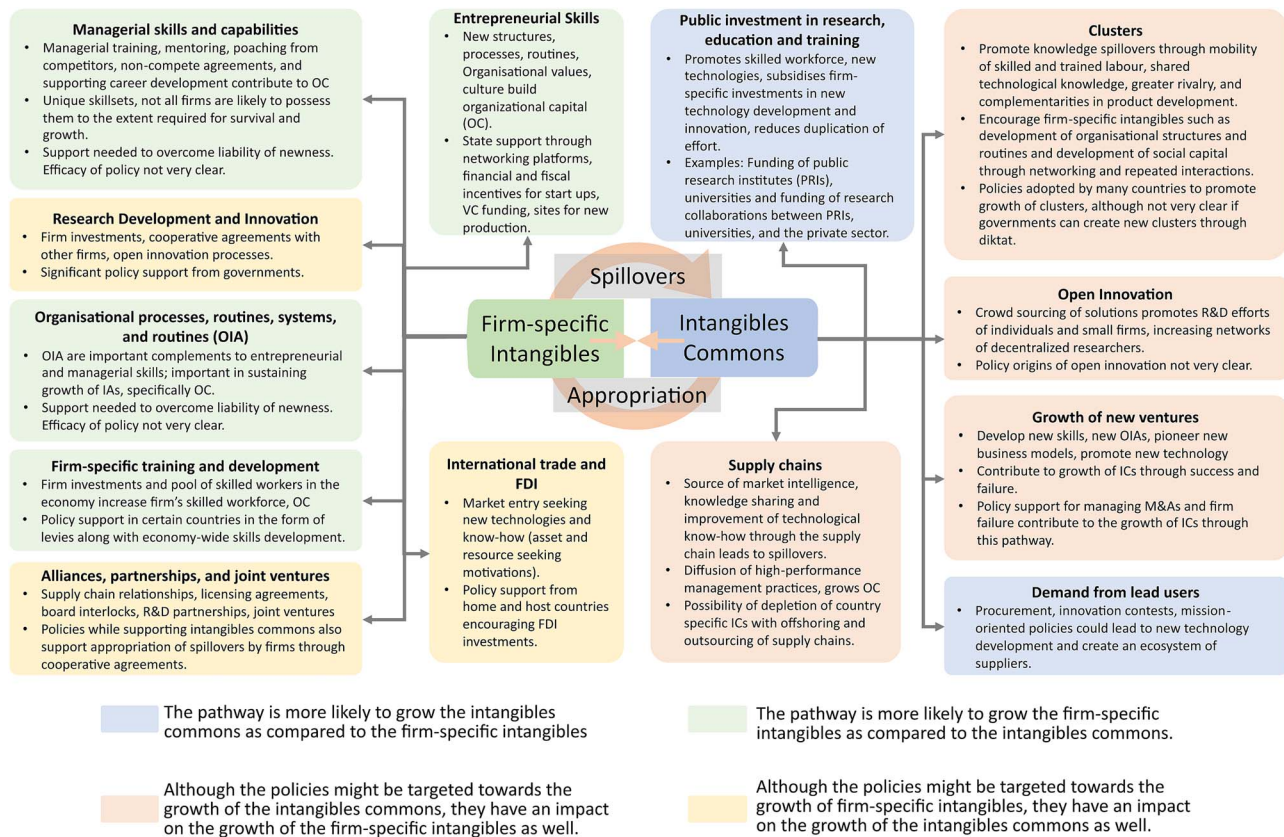


Figure 1. Growth pathways and policies supporting the growth of firm-specific intangibles and *intangibles commons*.

Table 1. Degree of appropriability and propensity to spillovers of different categories of intangibles.

Highly appropriable	Partially appropriable	Moderate propensity for spillovers	High propensity for spillovers
Organisational capital	Training other than firm-specific	Software products	R&D
Branding	Managerial skills	Databases	Creating entertainment and artistic originals
Firm-specific training		IPRs	
Trade secrets		Design and product development	
Custom-built software			

Source: Categories of intangibles adapted from Corrado et al. 2005; classification by authors **Note:** We would like to stress that although we categorize intangibles into four categories, they should be viewed as a continuum from highly appropriable to high propensity for spillovers.

of the owning entity, but limited excludability and non-rivalry in use could make the asset imitable given an appropriate storage medium and availability of complementary assets (Teece 1986; Crouzet et al. 2022). Another prominent challenge while conceptualising policies for intangibles is the paucity of information on the value of intangibles within the firm and the economy as a whole. The lack of measurement and hence, valuation of intangibles poses a threat to firms in terms of gaining financing to grow intangibles (Crouzet and Eberly 2019), and challenges policy makers to understand the scale and urgency of policy formulation to address issues around growth of intangibles.

Different categories of assets are grouped together as intangibles, because of their non-physical form. These different types of intangibles vary in the degree to which they can be appropriated or lend themselves to spillovers. See Table 1 below for our classification.

Given the range that various intangible assets exhibit in the continuum between appropriation and spillovers, developing policies for intangibles is a complex task.

Although management of IPRs are not the only appropriation strategies that firms adopt (e.g. trade secrets are another significant appropriation strategy), in high-technology industries and firms with evolving business model innovations dependent on technology (e.g. growth of Amazon, Google Play marketplaces), firms actively deploy IPR related strategies and governments seek to incentivize firm investments in innovation strategies through IPR and related policies (Cozzolino and Rothaermel 2018; Snihur et al. 2021). IPR related policies are also gaining prominence due to the evolving challenges of technology development and transfers for global economic and social sustainability (Jeffries 2013; Maskus 2019), where IPRs are being increasingly seen as a safeguard facilitating technology transfers. IPR policies are expected to balance the government goal of dissemination of technology and growth of the commons, while ensuring firms are able to appropriate returns on their innovation investments.

Policies that try to balance the tension between granting firms sufficient appropriability on the one hand and securing robust *intangibles-commons* on the other hand must contend

with the relationship between appropriability, competition, cooperation, and innovation (Bernal et al. 2022; Gassmann et al., 2010; Posen and Martignoni 2018). Policy-makers also need to assess the heterogeneity in firm sizes and their different demands on policies for retention and growth of intangibles. Thus, there are contradictory demands placed on public policy to address the challenges of growth of intangibles in the economy. In this section, we investigate the tensions of policy making and the trade-offs that policy makers have to make to address these conflicting demands.

A final observation is important. We see an increase of ambition of many governments to give R&D direction, to formulate mission oriented or transformative innovation policies. This means that the governments need to think even harder as to how to resolve the dilemma between appropriation and commons. The material difference compared to the traditional tension between firm's competitive advantage and industrial commons appears to be that now not only the dynamic of innovation across an industry or a system is at stake, but the direction it takes. So, any conclusion as to how to resolve the basic dilemma we discuss here will have to take the question into account, how policies for intangibles interfere with, or support, directionality and diffusion. So far, the conceptual literature on mission policies or transformative policies has not turned to the issue of how to adjust regulation and state support in order to give research, development and innovation the direction needed, and if and how this would interfere with other policy goals. It is beyond this article to delve into this use. However, on the basis of the analysis provided in this chapter, we can conclude that policy-makers need to factor in the interdependencies, complementarities and the resulting tensions in policies for intangibles.

3.2 Tensions between policies supporting appropriation and competition

Tensions between policies supporting appropriation and competition manifest in different forms. The IP Rights Regime serves well to limit imitation (Veer et al. 2016), it extends the duration for which the firms can appropriate value from the intangibles and thus encourages greater appropriation. However, this appropriation regime at the same time reduces the incentives for inter-operability, whereby often dominant firms attempt to control the standards regime and ensuring that fewer alternative dominant designs emerge—impacting on the level of competition, e.g. competing for the next generation of technologies such as Artificial-Intelligence and the internet-of-things (IoT) (Dubé et al. 2010; Mitomo 2017). Intangibles have also led to rising concentration in U.S. industries with evidence suggesting that R&D driven intellectual property and business processes increase productivity, whereas patentable R&D, trademarks or brands promote market power (Crouzet and Eberly 2019).

Firms are also increasingly using mergers and acquisitions (M&A) to increase their IA base. The M&A activity is not only focusing on critical technologies, but often also seeks to gain control over competing brands, skilled workforce, and secure relationships with suppliers and distributors in case of new market entry (Berger-de León et al. 2022). There are tensions between maintaining competition via antitrust enforcement, and markets for corporate assets that tend to concentrate control through M&As. Although M&As are

supposed to increase the dynamism of the economy by releasing intangibles and human capital trapped in inefficient processes and structures (Andrews and de 2012), over time, M&As can lead to market consolidation and reduced competition (Gomes-Casseres 2018).

Another tension arises from policies that encourage the growth and diffusion of intangibles through mobility of workforce and the vast safety nets that slow down or hinder mobility of the workforce which is a primary mechanism for knowledge spillovers. However, mobility is more likely to be high when there are flexible labour laws in place. When employment protection laws are strong, employers are more reluctant to let go of workers, and workers are less likely to be motivated to re-enter the labour market (Warhurst 2008; Mitra and Jha 2011). While these protections are beneficial for the growth of firm-specific-intangibles, they reduce competition for workforce and the mobility an important source of *intangibles-commons*.

3.3 Tensions between policies supporting appropriation and cooperation

As discussed in the previous sections, cooperation between firms can lead to the growth of firm-specific-intangibles as well as the *intangibles-commons* (Gomes-Casseres 2018; Bernal et al. 2022). The rising costs of innovation has also increasingly led competing firms to cooperate in some or all stages of the innovation processes, while simultaneously pursuing competitive strategies in other markets, also termed as co-competition (Biondi and Giannoccolo, 2012). The appropriation regime is extremely important for inter-firm cooperation and co-competition, as the regime clarifies the control and claims of the different firms to their preexisting as well as the jointly developed assets (Gambardella and Panico 2014; Hagedoorn and Zobel 2015).

However, the appropriation regime also allows firms to use defensive ploys to garner greater influence as compared to their cooperating partners and limit the future cooperation of the partners, thereby having the potential to limit the *intangibles-commons*. These tensions are more salient in high technology and research-intensive industries, where control of IPRs and evolution of platforms can have significant impact on the evolution of the competitive landscapes (Cozzolino and Rothaermel 2018; Snihur et al. 2021). An example of this strategic behaviour is standards setting. Policies must avert a proliferation of standards that can stymie technological progress. This, however, may support the dominance of a few dominant players, and policies must at the same time work to ensure that standards that result from IPR monopolies do not lock-in consumers to suboptimal technological standards (Blind et al. 2017). In contrast to regulations, standardisation is largely a bottom up, market driven activity, even if many standards are taken up by regulation (Blind et al. 2017). Thus, this tension between open and broad competition on the one hand and some control over the proliferation of standards on the other hand is exacerbated by the tension between top down and bottom-up dynamics. The challenge therefore is to still steer the technology development through laws that regulate competition and govern dispute resolution.

Furthermore, while standards can improve access to markets for those involved in it, this opportunity is not distributed evenly across the economy. In particular, SME face access challenges. The EU Commission, for example, has initiatives in

place to support the role of standards for SMEs, acknowledging the specific challenges they often face.² Furthermore, SMEs differ in their inclination to participate in standardisation and join standardisation alliances. Especially those with high R&D intensity, a high level of intangible asset, are reluctant to standardize as they fear a loss of knowledge (Blind and Mangelsdorf 2012).

3.4 Tensions between policies supporting appropriation and innovation

A further tension exists between the policy goal to enable appropriation through IP and thus innovation in a particular firm on the one hand and the policy goal for innovation and new entries in the market place more generally. Gans and Persson (2013) analytically demonstrate that due to the strong IP laws, new entrants are more likely to use cooperative strategies such as sale of innovations, M&As or long-term licensing of innovations instead of competing with incumbents directly. They argue that in light of the growing strength of the IP laws, competition regulators should offer more protections to new entrants when they enter into negotiations over the cooperative arrangements. Innovation policies also permit firms to use IPRs as aggressive and defensive competitive strategies (Cozzolino and Rothaermel 2018). For example, competition regulators are increasingly concerned about ‘patents ambush’, a process by which a firm that is part of the standards setting organisation (SSO) fails to disclose essential patent(s) during the standard setting, but extracts licensing fees after new products have been launched by competitors (Boldrin and Levine 2013; Kang and Bekkers 2015).

In view of the multiple strategic actions of firms to gain competitive advantages using IPRs, public policies for the development of the *intangibles-commons* can design a role for innovation intermediaries that can support the markets for intangibles. Such a market would promote knowledge flows, prod firms to unlock the value of IP that sits on the shelf unused, and fuel development of business models that are more efficient in allocation of corporate resources as well as the resource allocation efficiency of markets.

3.5 Tensions between public and private investment in training

Furthermore, there is a tension between private and public investment in training. Governments invest in skill development through two main avenues. One is through educational policies pertaining to schooling, higher education, and vocational training. The other is through reskilling programs and training programs that are required to meet the challenges of changing technological and business landscape of the economy. Both the approaches are required for developing firm-specific-intangibles as well as the *intangibles-commons*. However, there is a need for distinct institutional foundations for professional education and training. Moreover, funding has to be evenly spread between the universities and institutions providing short-term courses so that enrolment choices are not distorted by funding patterns (Warhurst 2008; Green and Hogarth 2016).

Governments also support firms by providing reskilling opportunities and training to employees who have been made

redundant by firms. Such support carries challenges of providing redundant employees with unemployment benefits while they get trained and search for a new job, provide assistance in training and job search, and provide counselling during the challenging period (Green and Hogarth 2016).

Governments take different approaches to fund their various skill development programs, including levies from firms, differentiated schemes to target specific categories of firms, and tuition fees; but governments cannot invest equally in all these approaches. Government priorities in terms of support of higher education, vocation training, and support for redundant workers will depend on many factors, including the degree of structural change in the economy (Silva et al. 2019). Involvement of the private sector in providing apprenticeships, incentives to hire workers with gaps in their employment history, and better feedback to ensure that curricula are updated to reflect the technological changes (Malcomson et al. 2003) are but some measures being increasingly undertaken to ensure that different sectors work together for skill development and reduce unemployment.

3.6 Tensions due to different needs of large and small firms

Finally, there are tensions due to different needs of large versus small firms. When it comes to developing intangibles there are distinct challenges facing large firms that are relatively mature as opposed to small firms, especially when they are new. Large firms often have substantial stock of intangibles (Bajgar et al. 2021). Their challenge is maintaining innovativeness while ensuring that its structures, process, and routines do not ossify with age (Loderer et al. 2017). For small and new firms, the main challenge is making the most of the intangibles that they have, and obtaining the complementary intangibles that are externally available at the lowest cost possible (Salavisa et al. 2012). A robust intangibles-commons can be vital for these firms, but is also useful for large firms. Government R&D support that is provided equally to small and large firms may benefit more large firms (Koga 2003), thereby suppressing new venture formation and forcing small firms to exit. Since in many instances exit takes the form of acquisition by large firms, antitrust policies have to strike a balance between industry concentration rising, thereby reducing intangibles-commons, and providing entrepreneurs with exit opportunities.

3.7 Illustration of lack of focus on intangibles in policy formulation

We studied the Research and innovation policy of the German government, based on the ‘Future Research and Innovation Strategy’ (Federal Ministry for Education and Research 2023), the ‘Federal Report on Research and Innovation’ (Federal Ministry for Education and Research 2024), and the OECD Reviews of Innovation Policy of Germany (2022). The Future Research and Innovation Strategy and the 2024 Report on Research and Innovation of Germany address a range of issues pertinent to intangibles. With the recognition of the significance of digitalisation, data driven applications such as artificial intelligence (AI) and sustainability, there is an emphasis in terms of institutional changes, funding, and changing legal frameworks to achieve the desired innovation outcomes. The planned Research Data Act, which is expected to be adopted by the German Federal Cabinet by the end of 2024,

² https://single-market-economy.ec.europa.eu/smes/growing-and-scaling-sme/improving-smes-access-markets/standardisation-and-smes_en

and the Health Data Use Act, which came into force in 2024, have been designed to develop standards for the interoperability of datasets and quality assurance of public sector data for research purposes by the research institutions as well as the private sector. Recognising the importance of computing power for AI and machine learning algorithms, the Federal Government has also introduced the ‘*High Performance Computing for the Digital Age*’ programme to support the development of high-performance computing (Federal Ministry for Education and Research, 2024: 7). Further, the two documents emphasize policies related to technology transfers between university/research institutes and the private sector (IP Transfer 3.0, German Agency for Transfer and Innovation (DATI)), clusters (*Clusters4Future*, examination of patent awards (changes to the German Patent Act, 2021), innovative procurement (*SPRIND*), access to finance through grants and fiscal measures such as R&D subsidies and tax credits (Growth Opportunities Act, 2024). The documents also highlight programs where SMEs especially receive consulting support in the digital transformation programs (Go-inno and go-digital, and *Mittelstand 4.0* Centres for Excellence) and funding for training programs to increase the pool of skilled workers (*Digital Now—Investment Support for SMEs*). In sum, the policy documents touch upon many aspects of supporting growth of firm-specific intangibles and *intangibles commons*.

However, there is no mentioning of the word intangibles, and no hint towards any tensions or any supporting policies to mitigate for those tensions. Similarly, while the OECD review of the German innovation policy approaches the innovation policy from the perspective of growth of intangibles, it also falls short of recommending holistic intangibles policies.

As argued above, this ignoring of the significance of intangibles and the impact of the characteristics of intangibles on implementation of policy could lead to pitfalls. Those pitfalls, policy-makers could well avoid if they take cognisance of the characteristics of intangibles. To illustrate, the German Federal policy documents emphasize that they want Germany and EU to play a significant role in standards setting in various technologies, such as quantum computing, AI and other data driven technologies. However, they fail to mention how they aim to balance between becoming standards setters and preventing regulatory capture through IP strategies and firm size and how they will intervene in the growing competition between countries. Policy makers recognize the significance of different forms of IP in many of the fields where they want to achieve leadership, but do not discuss how they would like to make sure that the technological markets remain competitive. Further, all policy documents continue to emphasize federal financial support directly or indirectly by funding venture capitalists (VCs) (*High-Tech Gründerfonds, Zuschuss für Wagniskapital*), but ignore changes required in accounting to recognize investments in intangible assets, creating an unlevel playing field between large and small firms.

This brief overview of German policies with a significant IP dimension illustrates, we argue, that it is important for policy makers to recognize the significance of intangibles in the economy and the impact that characteristics of intangibles could have on the policy outcomes. Furthermore, the cross-cutting meaning of the policies promoted, and their interplay, suggest, that in order to achieve policy outcomes, it appears indispensable to strengthen the cooperation between different ministries. Given the growing importance of IP related issues,

this might be achieved through a nodal committee/agency responsible for the growth of intangibles and the coordination of related policies.

4. Policy challenges of the future

4.1 Incomplete knowledge of policymakers

The gaps in policies emerge partly from the knowledge gaps on intangibles. Since there is considerable progress yet to be made in the subject area, policy makers are reluctant to design policies that can be difficult to reverse when further knowledge emerges (Skinner 2008).

First of all, there is a problematic lack of consensus when it comes to definition, principles, guidelines, measures, and measurement of intangibles in the firm’s accounting systems (Lev 2000, 2018; Massingham 2016). The lack of consensus translates into incomplete reporting of the intangibles in the company public accounts. Certain components of intangibles are slowly getting incorporated in the national accounting systems, but there is still little to no progress on their treatment in financial accounts of firms and their reporting (Lev 2018). This focus on measurement and lack of consensus on measurement between the micro and the macro levels in the economy impacts policy making, which is unable to develop evidence-based policies for the growth of all types of intangibles.

There is also a dearth of empirically rigorous studies examining the relationships and interactions between various components of intangibles and firm growth and profitability. There are multiple studies in the strategic management and innovation literature with a theoretical foundation in resource-based view, knowledge-based view, and dynamic capabilities that explore these themes (Gómez and Vargas 2012; Arrighetti et al. 2014; Riley et al. 2017), but these studies have used broad constructs and proxies due to the difficulties in measurement related to intangibles (Mollo et al. 2011).

It is clear that we need to understand how firms develop the processes and structures that enable the growth of intangibles within the firm. There are multiple studies that examine the processes related to intangibles growth from the perspective of marketing (Joshi and Hanssens 2010; Zhang et al. 2016), people management (Yang and Lin 2009), training systems (Ballot et al. 2006), skill development (Petrick et al. 1999), and organisational development (Witt 2000), but research that integrates or studies the underlying common processes has yet to evolve.

Another important knowledge gap that stands in the way of policy is a lack of understanding as to the variation in the strategies that firm use to develop IA. Firms are increasingly relying on the *intangibles-commons* to complement their innovation efforts through open innovation processes. However, firms have to navigate the ‘paradox of openness’ (Laursen and Salter 2014), the trade-off between opening up to collaborators and the declining power to appropriate knowledge from the collaboration. With collaboration partners changing across different divisions in multidivisional firms, and variations in leadership position across divisions, we still do not know enough as to how firm strategies change with organisational complexity.

Our survey of the literature (Sakakibara 1997; Teece 2006; Busom and Fernández-Ribas 2008; Herstad et al. 2010; Singer 2014; West et al. 2014; Edler et al. 2015) reveals the strides being made in developing the *intangibles-commons* related to

innovation property, but we do not know how the *intangibles-commons* functions for certain types of intangibles such as brands and organisational processes. Brands and organisational processes are highly specific to the firm, and emerge from idiosyncratic conditions. Replication in the ecosystem is contingent on many factors and could easily transform the focal process or brand into something new. We need more conceptual and empirical studies on the functioning of the *intangibles-commons* for some of these firm-specific-intangibles.

Further, there is also a spatial element to the concept of *intangibles-commons* that is poorly understood. The forces of globalisation and improvements in communications technology are making it easier to share information and knowledge across greater distances than before (Mudambi 2008). It is hence of greater interest to understand the spatial effects and limits of the *intangibles-commons*, and the implications of the differences in these spatial limits for different types of intangibles. Moreover, with the recent trends of increasing protectionism and nationalism (Evenett 2019), it is also important to understand whether, and to what extent, these factors are going to influence the development of the *intangibles-commons*.

Finally, and maybe most importantly, there is a lack of understanding of the tensions between different types of intangibles. In particular, the tensions we described above, the tensions between firm-specific commons and *intangibles-commons*, are insufficiently understood. This may very well be one of the reasons why policies that remedy those tensions are hard to find.

4.2 Incomplete knowledge of efficacy of policies

The other area that deserves a closer examination is related to the intelligence needed as to the impact of policies for individual intangibles and their relationship. More studies are required to systematically examine the relationship between public policies and components of organisational capital such as organisational structure, business models, branding, and marketing and advertising. While there are policies in place for certain aspects of the intangibles, such as software and innovation property (Edler et al. 2016; OECD 2019), we do not know if, and how, these existing policies can be extended to other types of intangibles such as organisational capital. For example, although there are policies in place, such as those related to incubation centres and clusters (Aragon et al. 2014), which support inter-firm cooperation in order to develop innovative capabilities of firms, it is not clear whether similar policies can help firms to develop intangibles such as organisational capabilities and processes.

Further empirical studies are also required to examine the impact of public policies on the growth of the IA per se. We are yet to understand how transformation policies impact the development of intangibles especially, across categories such as organisational structures and brands. Research on cross-country variations in policies (OECD 2019) and policy mixes and their impact on growth and productivity of intangibles are also needed to fill in the knowledge gaps on intangibles. These studies underscore the heterogeneity in policy formulation and response to differences in national systems. Studies are also predicting significant reallocation of labour resources in response to ongoing technological changes (Silva et al. 2019). However, there are few studies on the efficacy of such responses. While there are policies on intangibles as output of

the firm (e.g. film and music industry, software) (Lampel et al. 2006, 2007), more attention needs to be paid on intangibles as factors of production.

Despite a rather mature set of policies on IP rights, the functioning and impact of institutions underpinning markets for ideas are not well understood. This is especially true for administrative response to challenges regarding patent thickets and granting of patents (Menell 2019). Further research on these issues from a policy perspective not only can help address the challenges for the future, but also, understand the effectiveness of the current policy mix.

Finally, despite the growing interest in intangibles we still do not understand the processes by which policies that shape intangibles emerge. Nor do we have sufficient knowledge of how discussions between the various actors involved in the policy making process, whether political leaders, administrators, managers, or trade unions result in these policies. We also do not know whether and to what extent policy makers are aware of the need for policies on intangibles when policy makers consider how to increase growth. Although we distinguish between the *intangibles-commons* and firm-specific-intangibles, the mechanisms through which policy makers address the balance between growth of the *intangibles-commons* and growth of firm-specific-intangibles are largely unknown. We clearly have to make greater progress in developing knowledge on the effectiveness of policy making in creating intangibles.

5. Our recommendations

Given the enormous and growing importance of intangibles as described above, and given the contradictory signals and incentives policies send, we argue that it is of critical importance to reflect upon and design a holistic, systematic intangibles policy framework. The tensions arising from the interplay of firm-specific-intangibles and *intangibles-commons* discussed above and the intelligence gaps just described combine to create severe challenges for policy makers. Reflecting on the existing policies on intangibles, we can now derive at a set of policy gaps that would need attention by policy makers if we were to optimize the benefit of intangibles for our economies and societies.

5.1.1 The challenge of holistic policies for intangibles. First of all, our survey of the literature indicates that there are few if any specific policies on *intangibles per se* (Capelleras et al. 2011; Andrews and de 2012; Treasury 2018; Montresor and Vezzani 2022). Most policies are directed towards individual components or at most a few complementarities between different components (Andrews and de 2012; OECD 2019). There are a few exceptions, such as the Irish Capital Allowances for Intangible Assets policy, which recognizes growth in IA such as, IP, trade secrets, and software, as the target for public action (Donohoe 2018). On the whole, however, there is no coherent attempt to strike a balance between firm-specific policies that increase appropriability and policies that expand *intangibles-commons*.

Further, and this is of critical importance, existing policies and policy mixes often do not recognize sufficiently the balance between ownership of intangibles on the one hand and the dependence on intangibles developed in other firms for the growth of firm-specific-intangibles on the other hand. For instance, for more complex inter-firm relations such as

R&D partnerships, patent pools, and joint ventures, the legal systems and frameworks have to evolve to protect and manage IPR. Policies related to IP seek to reduce spillovers, reduce monitoring costs of transactions, and ensure that firms benefit from the network effects. However, such protections also increase the costs of inter-operability (Menell 2019). Further, while policies related to IPRs and training seek to restrict the mobility of knowledge, growth of intangibles such as software, R&D, and skilled personnel are dependent on the extent to which firms can collaborate with each other and build upon the knowledge bases of other firms (Hagedoorn et al. 2006; Berchicci 2013). It still appears as a policy lacuna that this interplay is not fully reflected. Given the increasing importance of intangibles and in light of the policy tensions described above, this is a serious shortcoming.

One category of policies that can serve to enable simultaneous growth of firm-specific-intangibles and the *intangibles-commons* are policies to stimulate innovation related interaction. Policies for clusters, networks or multi-party research projects (Edler et al. 2016) in principle encourage two-way interactions between firms and their ecosystems such that firms can draw knowledge on technology, organisational processes, structures, and business models from the *intangibles-commons* to develop their own specific intangibles and then share the updated knowledge with the pool to create a virtuous cycle of growth of intangibles.

5.1.2 Policies for firm-specific-intangibles. Our overview of individual firm-specific-intangibles indicates that currently public policies on firm-specific-intangibles are extensively geared towards increasing the productivity of the economy by increasing the innovative output and capabilities of firms. The markets for intangibles are distorted due to the characteristics of the asset as well as the heterogeneity in the characteristics of the firms (Rayna 2008). Policy interventions seek to address different types of systems and market failures including those due to increasing returns to scale, spillovers, information asymmetry and monitoring costs of transactions (Crouzet and Eberly 2019). Public policy interventions range from developing entrepreneurial and managerial skills, FDI, training and development and enhancing the framework for IP protections to well established R&D funding. The objectives of the policies are to enable the internalisation of intangibles by firms, and to maximize the rents that can be derived from them (Boldrin and Levine 2013).

However, there is limited policy support available for firms to enhance their managerial skills, or invest and grow their brands and relationships with supply chain partners and distributors, or develop organisational processes, routines, or structures, which are especially important for firms to grow their organisational capital, or enable the development and use of software and databases within the firm (Leadership and Management Network Group 2012; OECD 2019; Quinn and Scur 2021). Moreover, these policies largely neglect firm heterogeneity (other than firm size and age). This heterogeneity is important, because within the ambit of innovation strategies of firms, allocation of resources for different innovation processes will differ depending on internal and exogenous factors including complementary assets, embeddedness of the firms and their agents in a socio-political context.

A further shortcoming as for firm-specific-intangibles is the absence of dedicated and holistic policies or policy coordination for the development of organisational capital,

which is linked with the lack of appropriate measurements of organisational capital. Organisational capital reflects not only the firm-specific skills of the employees, but also investments in brands and other marketing activities, as well as organisational structures and managerial capabilities, which are important for the firm's valuation (Osinski et al. 2017). Organisational capital also includes social capital—the accumulated history of the relationship between the firm and its customer base, and beyond that the firm's relationship with the ecosystem and its embeddedness in the wider socio-cultural-political context (Nahapiet and Ghoshal 1998). Organisational capital is highly specific to the firm, and is an important marker of the difference between the firm and its competitors. Its policy support is both challenging because of this variety, but at the same time would have potential in particular for small and novel companies.

5.1.3 Policies for *intangibles-commons*. Policies for the *intangibles-commons* seek to promote the growth, accessibility and flow of knowledge in the economy and its broad use to increase productivity and welfare. These policies have two aspects. First, they attempt to increase interactions between the various actors making knowledge and information sharing easier (Landoni 2017; Monitor Deloitte et al. 2015; Uyarra and Ramlogan 2012). Second, they seek to set a limit on the extent to which actors in the ecosystem can appropriate benefits from the interactions at the expense of other actors (Hemphill 2005; Baird 2007). Those policies are a part of a complex landscape, where different elements such as firms, suppliers, academia, and governments are constantly collaborating and competing with each other and different policy instruments interact with each other, which may either mean they mutually reinforce or it means they dilute each other's impact. Policy mixes therefore have to be carefully crafted and implemented for optimal benefits to both firms and the *intangibles-commons*.

From the survey of the literature (Da Rin et al. 2006; Lee et al. 2011; Andrews and de 2012; Edler et al. 2016; Landoni 2017; Crouzet and Eberly 2019; Menell 2019) on the various agencies and avenues that develop the *intangibles-commons*, we find that policies related to IPR, financing of risky ventures, especially through venture capital and angel investors, bankruptcy, competition, skill development, innovation systems, procurement, and social safety nets have a significant impact on the growth of the *intangibles-commons*. Some of these policies while important for the growth of *intangibles-commons* are also important for the growth of firm-specific-intangibles. While there are significant ongoing discussions on strengthening policies related to these areas, the implications for the growth and development of intangibles are not explicitly considered.

Two examples for this limitation stand out. First, policies that encourage formation of venture capital are vital for financing new ventures and are therefore not only important for creation of firm-specific-intangibles but they also simultaneously grow the *intangibles-commons* by creating knowledge resources, and evolving venture capital ecosystems. Venture capital firms not only provide finance but also provide advisory services to their clients (Peneder 2010). They also provide networking opportunities to the new firms thereby encouraging technology collaboration, facilitating raising of additional finance, and brokering M&As. Thus, VCs act as important disseminators of information and contribute to the

intangibles-commons both directly and indirectly (Da Rin et al. 2006; Scillitoe and Chakrabarti 2010). Second, policies that shape bankruptcy laws are important because they provide a viable exit option. Well-designed bankruptcy laws ensure that investments in a new venture are not all sunk costs, that some can be recouped if the firm is dissolved (Lee et al. 2011; Andrews and de 2012). Simultaneously, bankruptcy proceedings also provide an avenue for competitors and consortia to gain valuable firm-specific knowledge, thus indirectly adding to the *intangibles-commons*.

To sum up, policies for intangibles are imbalanced, as is our knowledge about the relative meaning and effects of policies on intangibles. There are strong and highly differentiated policies for some firm-specific-intangibles, such as RDI, and a considerable knowledge base as regards policy effectiveness. For other firm-specific-intangibles, such as organisational capabilities or software investment, and for *intangibles-commons*, policies and our knowledge about policies are much more limited. Thus, there is a growing realisation that intangibles as a class of assets need to be studied in much more depth and breadth in order to develop appropriate and effective policy portfolios across the board of intangibles. Policy-makers and analysts together would have to fill the policy gaps prepared by filling our knowledge gaps on intangibles. This development should, in our view, be supported by an institutional innovation for intangibles and IPR.

5.1.4 The missing link: Institutions for intangibles and IPR.

Given the tensions arising from the application of IPR policies bottom up, unplanned and often with policy makers being unaware of them, and given the gaps we have identified, a major gap. Thus, our last and major policy recommendation is to build up an institutional framework for intangible policies. By this we also mean an institution with the main purpose to identify gaps and tensions and to advice different policy areas designing intangible and related IPR policies accordingly.

We can illustrate the importance of such institutions with two critical examples. First, the supporting role of institutions can be critical when it comes to the growth and development of intangibles. Contests over knowledge related assets, whether software, or patents and other intellectual property arise due to the partially-excludable characteristic of knowledge and spillovers (Lampel et al. 2012). It is essential to establish ownership rights to be able to appropriate any rents from related investments. Firms accumulate defensive patents to countersue potential plaintiffs and mitigate holdup risk (Ziedonis 2004). They also engage in portfolio races to gain competitive advantages (Jell, Henkel & Wallin, 2017). An institution that can adjudicate these contests would therefore be extremely important for the development of markets. It would become all the more important in technical standards which govern access to platforms, play a critical role in the decisions of firms to provide complementary products, and encourage programmers to adopt certain technical standards and programming languages (Menell 2019).

Second, institutions for intangibles would also be needed to support the organisation of data. The development of digital technologies has led to unprecedented rise in the ability of firms to gather and transfer data with ease across borders. Data are being gathered through websites, smartphones and usage of intelligent systems such as the IoT, and cloud computing (Kshetri 2013). Databases with customer information are important intangible assets, because these

data are confidential and hence, they are not freely available in the markets (Matwyshyn 2009). The EU General Data Protection Regulation is leading regulatory efforts on data and privacy protection across the globe (Schwartz 2012). In light of the changing regulations, firms have to evaluate the trade-off between data privacy and the advantages of business models that aggregate and provide information. Developing policies in this realm also requires new regulatory institutions, agreement on norms to be followed by various organisations across the globe and the underlying principles on which these systems rest.

6. Conclusion

IAs are a key component of the productive assets in the economy. Investments in IA are outpacing investments in tangible assets in most developed countries. Estimates by (Corrado et al. 2018) suggest that in the period 2000–2013, compounded annual average rates of growth of investments in intangibles has been greater than that of investments in tangibles in key 18 countries belonging to the European Union and the United States. These growth rates represent a fundamental change in how value is created in most developed economies. Firms increasingly owe their value not only to the greater sophistication and higher productivity of their production systems, but also to product and process innovations, and to assets such as brands, reputation, quality, and trained personnel (Teece 2015).

Although there is a growing literature on the measurement and productivity impact of intangibles (Corrado et al. 2018; Piekkola 2018), policy research on this topic has lagged behind policy research on other areas. Summarising the review of available literature, we find that there are no policies on intangibles as a category. Policies are fragmented and target one or two components of intangibles. Although policies may target areas where creation of intangibles is crucial, the motivation is rarely intangibles themselves.

A major obstacle for making progress on policies for intangibles is the fact that policies are often in conflict with each other, for example, development of the *intangibles-commons* may conflict with policies that ensure firm appropriation of benefits from intangibles. Conflicts in policies also arise due to the heterogeneity in firms due to age, size, and organisational complexity. In addition, the mechanisms linking creation of intangibles at the macro and micro levels are complex and poorly understood (Lev 2018). Moreover, policies may focus on certain components of intangibles distorting creation of intangibles overall.

The accumulated literature thus far suggests that progress has been made in recognising the importance of intangibles for productivity and growth at the economy level, and likewise the importance of intangibles in creating competitive advantage at the firm level (Villalonga 2004; Goodridge et al. 2013; Piekkola 2018). Scholars have to build on this stock of knowledge and delve deeper into understanding the complex lifecycle of intangibles from generation to revitalisation of stocks of knowledge.

We hope that this article stimulates conversations on the policies for intangibles as an entirety. We conceive of three major research directions that can be derived from this report. One major research avenue can be the development of conceptual models and frameworks for the interactions between firm-specific-intangibles and the *intangibles-commons* under

the different regimes of competition, cooperation, and co-competition. Another significant research avenue can be the study of policy instruments for intangibles, the interaction effects of bundling them in policy mixes and delineating the significant changes required in these instruments to implement them for various categories of IA. The third is research on institutions needed to underpin a dynamic balance between firm-specific intangibles and the *intangibles-commons*. The characteristics of intangibles lend themselves to contests over control, ownership, and appropriation. The contests emerge due to ambiguities in ownership, standards, measurement, and valuation. The resolution of these ambiguities requires greater clarity from formal institutions as well as development of norms and values. This is the more important if policy, and thus societies, want to orientate innovation activities towards explicit societal aims and speed up their diffusion accordingly. Governments who are better equipped to deal with the policy tensions we outlined in this paper will have improved their position to deliver on the societal solutions they aspire to.

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