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Appropriability of design innovation across organisational boundaries: exploring collaborative relationships between manufacturing firms and designers in Italy

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Abstract

Capturing value from design-based innovation presents firms with some challenges which only recently academic research has started addressing. Increasingly, firms operating within design-intensive industries collaborate with external designers rather than undertaking this activity in-house. This raises some appropriability issues, as firms would need to reap the benefits of innovation originating across organisational boundaries. To address this gap, we carried out a multiple-case study with firms and design consultants based in Italy across several manufacturing sectors. Our evidence suggests the presence of appropriability mechanisms that are specific to design innovation. Intellectual property rights, although not very effective, are employed to establish ownership in the market. Firms also use lead-time advantages, investment in specific assets, and the quality of craftsmanship depending on the industry. Across most sectors, establishing long-term relationships inspired by knowledge sharing and trust constitutes a key mechanism firms adopt to appropriate the benefits attached to collaboration with external designers.

Keywords: Industrial design; appropriability; design consultant; design innovation; multiple-case study.

JEL Codes: O33; O34; M21.

1. Introduction

The idiosyncratic nature of knowledge as a (quasi) public good has posed a major challenge in innovation studies: how do firms appropriate the results from their innovation? If an innovation can be easily imitated, imitators may capture part of the benefits. The way market economies have evolved has encouraged business sectors to invest in research and innovation via adopting certain strategies or engaging with institutional mechanisms, which would enable companies to reap the returns from their investment in knowledge generation. Intellectual property rights, most notably patents, are one of the most relevant institutions established to encourage technological innovation in the private sector. However, they have proven not to be as effective in preventing imitation and inventing around, with the exception of a few hi-tech industries (Cohen et al., 2000). In fact, in order to get advantages from the inventions and innovations profit-seeking agents pursue several other strategies, such as secrecy, lead-time advantages, complementary factors in sales or service efforts, and economies of scale (Cohen et al., 2000; Teece, 1986).

This paper focuses on the mechanisms underpinning the appropriation of value deriving from design-based innovation. This focus is relevant for several reasons. First, product designs are subject to high degree of imitability when compared to new technologies. As Gemser and Wijnberg (2001) put it, design “bears its know-how on its face”; although this does not consider the importance of the production process, it is easy to see that imitation is easier and cheaper in the case of product design when compared to complex technological systems. Second, protection mechanisms for intellectual property rights are perceived to be not as effective in the context of design-based innovations because barriers to imitation are very low and ‘inventing around’ is easier when form plays a more prominent role compared to technology. Last but not least, studying appropriability issues in the design innovation industry is interesting because of the major role played by external designers in firms’ innovation processes. Increasingly firms develop their products in collaboration with external design consultancies (Candi and Gemser, 2010; Verganti, 2003; Walsh, 1996) and managing these collaborations results as a rather arduous task.

For the process to be effective, external designers¹ need to be involved and integrated within the innovation process of the firm. In addition, they also need to develop a deep knowledge of the specific firm and industry (for a recent review, refer to D’Ippolito 2014). It is therefore not surprising that some have argued for design to be a fully integrated business

¹ In this paper we use ‘design consultant or consultancies’ and ‘external designers’ interchangeably.

function because of its strategic relevance (Perks et al., 2005; Walsh et al., 1992). Despite of this, evidence suggests that collaborating with external designers is diffused practice in many countries (e.g., Utterback et al., 2006). There are however two sides of the coin to consider: on the one hand, firms benefit in various ways while collaborating with external designers instead of internalising the design function completely; on the other hand, firms are required to implement specific mechanisms to make sure they appropriate returns from their design innovation.

The above argument points to a situation in which design-based innovation can be easily imitated, and appropriability is further threatened by the presence of external designers, and yet, there is abundant empirical research suggesting that design constitutes a prominent source of competitiveness, innovation, and economic performance for the firm (Chiva and Alegre, 2009; D'Ippolito, 2014; Filippetti, 2011; Hertenstein et al., 2005). This leads to our research question: *which mechanisms do firms employ to appropriate benefits and extract value from collaborations with external designers?*

Although the issue of appropriability poses relevant problems, it has received scant attention. Research has so far focused on different mechanisms – formal and informal – and types of barriers, which increase the appropriability conditions of companies introducing design innovation. The role of intellectual property rights (legal barriers) to prevent imitation has been explored (Filitz et al., 2015); others have proposed the presence of informal mechanisms, as in the case of reputational capital, which prevent companies to imitate others when they are recognised as original innovator (Gemser and Wijnberg, 2001); recent works have included the role of the demand, proposing that consumer reactions to design similarity may act as natural barriers to imitation (Filitz and Henkel, 2016).

Whilst extant research questions appropriability issues once the product has reached the market (potential threat from competitors), the growing trend of externalising design activities poses additional challenges for appropriation and value extraction throughout the process of developing a product, more specifically with regard to the interactions between firms and design consultants (potential threat from collaborators). This paper contributes to this research by focusing on the specific mechanisms that are employed by firms to appropriate innovation benefits and extract value when they collaborate with external designers; that is when innovation originates across firms' boundaries as it is often the case for design-intensive products. In order to address these issues, we have carried out multiple-case study research in the manufacturing sector, including furniture, lighting, electrical equipment, interior design, synthetic lining materials, yachts, sailing boats and fashion;

twenty direct, face-to-face, interviews with both design consultants and companies in Italy between 2008 and 2009 were conducted and analysed.

Below, we review the literature on appropriability of design-based innovation (Section 2) and illustrate the research design adopted to address the identified gap (Section 3). Findings are presented in Section 4 whereas Section 5 discusses how innovation that originates across organisational boundaries raises appropriability issues which tend not to rely on established protection mechanisms. Section 6 concludes and sketches possible avenues for future research.

2. Appropriability of design-based innovation

Design-based innovation has gained increasing relevance because of its role in the way firms innovate and reap the related benefits. It has been argued that firms tend to collaborate with external designers rather than designing their product fully in-house; this leads us to question to what extent firms are able to exploit the benefits of the intellectual capital generated as a result of their effort. In this section we first explore the formal and informal mechanisms that characterise the appropriability of design-based innovation and, second, we examine how these aspects are challenged in the context of innovation that is generated through collaborations.

2.1 Formal and informal mechanisms of appropriating design innovation

Appropriability – i.e., firms' capacity to reap the benefits from their investment in design innovation – has received considerable attention by scholars interested in technological innovation. Research has illustrated how firms use an array of strategies including patents and other intellectual mechanisms to protect property rights such as secrecy and lead times (Cohen et al., 2000), high costs and time required for duplication, learning curve effects, superior sales, and service efforts. In other words, firms seek to implement a vertical strategy that allows them to deploy complementary assets (Teece, 1986).

As far as the formal barriers in the design industry are concerned, firms can protect their design innovations by employing the design registration in dedicated national offices.² In

² The story of the protection of industrial design is strictly related to the development of the manufacturing industry. Back on 1787, the “Designing and Printing of Lines, Calicoes and Cotton and Muslin Act” was the first law giving protection to industrial design in the United Kingdom. The protection of design to every manufacture industry was recognised in the Design Act of 1842 in which protection was extended to “any new and original design whether such design be applicable to the ornamenting of any article of manufacture” (WIPO, 2008).

addition, firms can register their design to the European Union Intellectual Property Office (EUIPO), known as Office for Harmonisation in the Internal Market (Trade Marks and Designs) (OHIM) until March 2016. To be registrable, a design must be applied to an item that has a utilitarian function. The content of the protection provided by the design registration is both aesthetic and functional in nature. It can emphasise the aesthetic feature, quality, and style, or it can focus on usability, ergonomics, tailoring, and modularisation of the product. In order to be accepted, a design has to be new and original. The latter means that it can be distinguished from other designs thanks to relevant features. The EUIPO regulation excludes from the protection of design registration “non-visible parts in normal use” and “features of appearance of a product which are solely dictated by the technical function of the design”.³

The protection related to design registration grants the owner the exclusive right to prevent the unauthorised commercial exploitation – production, selling, import, or export – of the design in industrial items. Obviously, novelty in design is not related to the object, inasmuch as industrial design on chairs and wheels are continuously registered. Novelty is rather linked to the way the object is designed, that is: the appearance and the form of the object (aesthetic element), the way a person can use it (functional element), and the way objects are interconnected or produced. The duration of the rights assigned to industrial design varies from country to country: the right can usually protect the design from a period of 10 to 25 years; this period tends to be divided in two terms, and owners must reapply for an extension of the term to renew their registration.

Contrary to research about the role of patent and technological innovation, “design innovation and design protection have attracted little scholarly attention from economists and management scholars” (Filitz et al., 2015:1193). However, consensus exists around formal protections of design as preventing imitations only moderately; moreover, they tend to be used in combination with other legal instruments, such as patents and copyright, although less innovative firms tend to use them relatively more than patents (Gallié and Legros, 2012).

Along with studies on legal barriers, other works have explored non-legal and informal mechanisms which can increase the degree of appropriability that are peculiar of the design industry, and hence different from those identified in the technological innovation field of studies. Gemser and Wijnberg (2001) for instance propose a design-specific mechanism for deterring imitation based on reputational capital as a “form of private ordering that govern

³ Directive 98/71/CE, art. 3 and 7.

firms' action" (2001:565). They find that the presence of reputation sanction can be an effective mechanism for capturing the returns from investment in innovation design. This mechanism is reinforced by the presence of several links between the firms, which make it easier to detect imitation and impose reputational sanctions.

Filitz and Henkel (2016) introduce a novel concept of relative product differentiation – relative differentiation - developing a demand-side model for the perceived quality of a market offering as a function of firms' design choices relative to competitors; here, barriers to imitation can arise from psychological processes of the customers triggered by visual similarity. This perspective builds and complements studies that have looked at brand image and reputation emphasising the symbolic meaning of design (Dell'Era and Verganti, 2007; Gemser and Wijnberg, 2001; Utterback et al., 2006).

2.2 External collaboration and appropriability of design innovation

The challenges attached to appropriability are rather pronounced when firms undertake part or all of their innovation activities in collaboration with third parties, in which firms rely not only on their internal expertise but also their inter-organisational relationships. Previous research has illustrated how design-intensive firms have become more networked and significantly rely on the contribution of various actors, such as users, design firms, and suppliers, for their innovation activities (Utterback et al., 2006). This trend is justified by the fact that customer and supplier involvement in the design process has a positive impact on new product performance through the provision of useful input (i.e., knowledge as resource) (Menguc et al., 2013).

Firms are called to decide how to source specialised knowledge, that is, whether they should develop design expertise in-house or source it via collaborations with design consultants (Abecassis-Moedas and Benghozi, 2012; Candi and Gemser, 2010; Filippetti, 2010). On the one hand, it has been argued that design should be fully integrated within the firm given its strategic relevance (Perks et al., 2005; Walsh et al., 1992); on the other hand, the in-house option can lead to potential disadvantages such as a lower degree of diversity within the firm or a situation of creativity lock-in (Bruce and Cooper, 1997; Ravasi et al., 2008; von Stamm, 2008). Empirical evidence indicates that the externalisation of design activities is an established strategy in several countries such as United States, Japan, and Europe (Utterback et al., 2006), mainly because external designers can act as gatekeepers across firms' interactions. External designers are not always a passive node within the network, but are often an active actor supporting the firm in the establishment or

strengthening of a network of relationships. The role of designers as focal points has been stressed in the model of radical design-driven innovation (Verganti, 2003). In this model, firms seeking to pursue this strategy need to interact with several actors, including users, clients, training institutes, in order to access knowledge about new languages and socio-cultural models. The increasing important role of professional designers has also been recognised in the design thinking view (Dunne and Martin, 2006; Stevens and Moultrie, 2011) and seems to encourage firms towards developing a portfolio of designers (Dell'Era and Verganti, 2010).

Collaborating with external designers poses new challenges to the way in which firms can appropriate benefits from innovation. To start with, firms and designers can have different incentives regarding the diffusion and imitation of their projects. Research on art for example shows that artists are happy when they get imitated (Wijnberg and Gemser, 2000). Secondly, firms and designers may operate according to a different time horizon. As the research on design thinking has shown, firms are projected in the long run when introducing a new design; this is essential to allow customers enough time to familiarise with the new product and functionalities. Therefore a new product needs to be simple, with additional functionalities to be added progressively (Pauwels and Bod, 2014). This may not correspond with the intent of the designers, who often thrive for revolutionary design propositions. Thirdly, design-intensive companies build over time a brand, a philosophy and a style which make their products immediately recognizable from users. External designers need to align themselves to these company-specific factors in order to deliver new projects that are consistent with them.

Finally, these forms of collaboration are knowledge-intensive in that a great deal of knowledge and information has to be shared from both sides. The extent to which exchange of information between two actors occurs in a successful way depends on several circumstances. The presence of norms, such as trust and reputation, as well as other social mediating factors, such as the presence of inter-personal networks, have proved being more important compared to market-factors for the aims of regulating knowledge-intensive forms of collaborations (Adler, 2001; Granovetter, 1985). A recent study which looks at the relationship between the furniture industry and external designers in the North of Italy illustrates how these relationships are embedded in a dense network of interpersonal and inter-organisational connections (Capaldo, 2008). As a result, reputation mechanisms and mutual trust emerge as a central means to promote knowledge-intensive cooperation.

Summing up, while research on technological innovation has largely explored the nature of the appropriability mechanisms, research on design innovation has been so far rather scant. The interest in this area lies on the fact that the design-environment has inherent peculiarities which are worth exploring. As the studies reviewed above illustrate, there exist mechanisms such as the reputation capital, norms, and sources of differentiation, which affect the imitation strategies of the firm that are specific of the way in which competition takes place in the design industry. This paper seeks to shed light on this area by addressing another characteristic which is inherent to the design industry, i.e., collaboration with external designers. While there is now abundant evidence on the reasons why firms prefer the outsourced strategy to the internalisation one, there is a lack of understanding about the mechanisms put in place by companies to appropriate innovation in these cases, and therefore to extract value from these types of collaborations.

3. Research method

In line with several other contributions, and given the relative early stage of empirical research in this field, we opted for grounding our analysis on exploratory case studies (Miles and Huberman, 1994; Yin, 2003). The choice of the qualitative approach is also consistent with the need to examine how firms decide upon their innovation strategies, the type of knowledge to be developed, and which mechanisms of appropriation they should implement to reap the related benefits. These factors are very difficult to capture by means of quantitative analysis. It has been also acknowledged that multiple-case design is more compelling and regarded overall as being more robust (Yin, 2003).

3.1 Data collection

Accordingly, twenty direct interviews were carried out with both design consultants (external to the firm) and firms in Italy. For building the sampling we followed two approaches: criterion sampling and snowball or chain sampling. In the first place, we established some characteristics of the firms and the designer. They should all be placed in Italy (in order to have a homogenous institutional environment), and they should be involved in product design in manufacturing industries. Then, we sought to make sure different industries were included in our sample, in particular those industries in which design is recognised as a distinctive feature in product design and are typically known as ‘Made in Italy’. Furthermore, we wanted to include in the sample companies that tend to work with external designers, in order to

investigate this particular aspect. Finally, we decided to interview design consultants, for they could answer our research questions from another standpoint compared to firms', given our interest in the relationship between the companies and design consultants.

Once we have established these criteria we employed a snowballing or chain sampling. In particular, we started by interviewing some design consultants in the areas of both Rome and Milan, the two largest cities in the country; these initial contacts helped us identify other participants who could best match our research needs. This led to us interviewing ten design consultants and ten companies (see Tables 1 and Table 2). As for the latter, they tend to be medium and large firms, characterised by considerable export capacity and international reach (a typical characteristic of the made in Italy), covering several manufacturing sectors including furniture, lighting, electrical equipment, interior design, yachts, sailing boats and fashion. We have also included in the sample two companies that employ internal designers, *Elica* and *Fendi*. We will use them as a counterfactual, the former as exception in the kitchen hood industry, the latter instead as a common characteristic of the fashion industry.

--- Table 1 and Table 2 about here ---

We made one interview for each company, in which we asked to talk to those responsible for the relationship with design consultants and the integration of design into the process of new product development. As a result, we interviewed either the firms' product development manager or the marketing and innovation manager. In some cases, where a Research and Development department was present, an R&D manager also joined the interview.⁴ In the case of the design consultants, we always interviewed the chief designer and some of the collaborators if present. The interviews were conducted at the interviewee's site, and lasted on average two hours. Interviews were open-ended and assumed a conversational tone, yet followed a set of previously prepared questions. Although interview questions were adapted to each and every case depending on whether the interviewee was a firm's manager or design consultant, interviews broadly uncovered the following aspects: how the firm undertakes design-based innovation (e.g., internally and/or in collaboration with external designers) and how it influences the firm's possibility to appropriate the benefits of such innovation; the relevance of existing mechanisms of IP protection for design, including in the case of innovation that originates across organisational boundaries; the mechanisms or set of actions

⁴ In the remainder of this paper, we will refer to the interviewee within the firms as firm's manager.

put in place to protect design-based innovation; and other likely factors (e.g., personal relationship with external collaborators, location of the firm) that may affect firms' decision as to how they would undertake design activities and thus, appropriate the deriving benefits.

Before the interviews, in addition with the academic literature, several complementary sources of information were examined, i.e., specialised journals, newspaper articles, and a recent book including more than fifty interviews with famous designers (Follesca, 2009). These sources were important to focus on the more relevant issues as well as to better prepare the set of questions.

3.2 Data analysis

From a methodological point of view, when dealing with case studies the issue of generalisation is a common concern (Yin, 2003). Two major strategies have been adopted here to address this issue. First, as already explained, different manufacturing industries in which design plays a central role were covered. Second, when interviews were carried out within the firms it was always asked to what extent their answers would reflect a feature specific of the company or instead common to the whole industry.

In the context of this research, design is understood as the set of activities (as in Gemser and Leenders, 2001) or processes that rely on a diverse knowledge base and encompass both analytical (engineering) and symbolic (meanings) knowledge (Verganti, 2008; Walsh, 1996). In other words, we define design as a process involving “a set of choices concerning both the form and the function of an object as well as the activities that underpin these choices” (Ravasi and Stigliani, 2012:2) . It is also a service that provides input to the innovation strategy of the firm, both within and across organisational boundaries, i.e., both in relation to the specialisation of individual firms and the industrial domain within which they operate (D'Ippolito et al., 2014).

The above definition has driven the process of data analysis. In a first round of data analysis, we examined interview data by searching for the nature of design activities and the way these were undertaken, that is, assessing whether firms opted for internal or outsourced design and the extent to which the contribution of the designer regarded a specific project or went beyond the remit of a single project. All interviewed firms except two collaborate with external design consultants. We use the two cases of internal design as a counter example to be contrasted with the cases in which firms opt for external collaborations. Designers themselves have confirmed that the externalisation of design activities is by and large increasingly diffused. Firms reported to choose external designers for two fundamental

reasons. First, it is important that both designers and firms operate in full autonomy. As remarked by a marketing manager, “designers must be free to suggest their ideas; likewise, we [the company] must be free to accept or reject the ideas proposed by the designers”. A similar opinion emerged from the designers, who also argued that they prefer to work as freelancer in order to be more autonomous. They also emphasised that autonomy allows them to be involved in different projects across different industries, thus developing a diverse set of expertise (we discuss the importance of this aspect below in detail). Second, as an R&D manager explained, they have never decided to create an in-house design centre, because design needs “to stay open to the tide of ideas outside”. This claim concisely suggests that the added value of employing external designers consists in their ability of proposing innovative suggestions, regarding for instance new technologies, production processes, materials, concepts, or languages, deriving from their broad experiences across different fields of application, sectors, and industries. Their capacity to propose innovative solutions to each firm is likely to increase insofar as they are involved in different contexts, thus acting as knowledge gatekeepers. Whilst there are barriers to use external designers because of the high costs involved, “there is no vade mecum as to where design activities should be best located, either within or beyond organisational boundaries” (D’Ippolito, 2014:719). In some firms, the designer is also the firm’s art director; in others, the design consultant is only one of many actors within the value chain (Ulrich and Eppinger, 1995).

Where external designers are consulted, we found that these work in tandem with the product development department from the very beginning of the conceptual phase (in the cases in which designers are in-house, they work side-by-side with the product managers in the same department). Designers are involved especially in the first two phases: concept and prototyping. During the conceptual phase, the designer continuously interacts with at least three departments within the company: marketing, product development, and R&D.⁵ During these early stages, the model would change depending on materials and other technical problems. In this phase designers are deeply involved in searching for new materials or developing a new solution to solve technical problems, although most modifications need to be evaluated also from a cost perspective.⁶ In this phase, designers bring in their competencies in terms of ergonomics, form, usability, and materials to be used and production techniques. It is mostly here that the cross-industry competencies of designers

⁵ Of course this depends on the internal organisational structure of the firm. What is important here are the three sets of competencies of the three areas which designers need to work with.

⁶ Again, the interplay between the technical factors and market factors is here evident.

play the major role. The output of the conceptual phase process is generally a prototype. Here the designer plays an important role in evaluating the consistency of the final results with respect to the original idea; most of the focus is on production techniques and the final choice of the material to be used. Once the model is approved and it passes to the engineering and production process, typically the involvement of the designer is over.⁷ However, some contribution by designers can be required during the engineering phase and/or the production phase if any important changes to the product are needed or some major technical problem arises. In these cases, interviewees drew attention to the constructive relationship established between designers and specialised suppliers: designers had to work in tandem with suppliers to solve particular problems with materials. Therefore, designers may represent an important asset not only for their know-how but also their know-who (i.e., relational capital).

There are exceptions to the above scenario. Despite some concerns on the side of the designers, our empirical evidence illustrates cases in which firms do not engage with designers in the early stage of a project development. In the case of *Faber*, the first major input to the conceptual phase is provided by the engineering design, who often is employed by the firm. The (external) industrial designer is only at a later stage consulted for dressing the new product. For instance, they developed a new kitchen hood with a new silencer system, the engine of which has been quite cumbersome. The designer was asked to ideate a cover, which could feature the system with a “*soundless softness*” (from interview data). A similar experience comes from *Guzzini Lighting*, where the development of new products is often triggered by an explicit strategy of reducing energy-consumption costs. Once the technical solution is developed, a designer is asked to put it into a complete solution. Secondary data were key in helping understanding the context of our interview data, in particular the dynamics underpinning the development of the Italian design industry and the nature of relationships across sectors.

Following the data analysis approach described above, we present our findings in the following section. We first illustrate the mechanisms of IP appropriation that characterise design-based innovations; then, we explore non-IP mechanisms of appropriation, and in particular highlight different strategies put in place by firms to reap the benefits of their design-based innovations; finally, we focus on how firms seek to tackle appropriability issues that may arise from collaborations with external consultants.

⁷ This can depend on the fact that in our cases the design consultant studios are of small and medium dimension. There are large design companies which can also be involved in the engineering activity.

4. How do firms capture the returns from design-based innovation?

The aim of this paper is to explore how firms appropriate the value of non-technological innovation, in particular design-based innovation. As argued in the literature review, the nature of knowledge underpinning design (i.e., highly creative) and the way it is expressed (i.e., visible to human eye, and thus easier to imitate) are some of the main obstacles firms have to deal with when trying to protect their intellectual capital. Mechanisms to protect design-based innovation are further challenged in the case of innovation originating across organisational boundaries, which – as argued above – is often the case for design. In this section, we evidence IP and non-IP mechanisms of appropriation most commonly adopted by firms (Section 4.1 and 4.2, respectively) and argue for trust as constituting another important mechanism whereby firms appropriate design innovations originating from collaborations (Section 4.3).

4.1 IP mechanisms of appropriation: design registration

Technological innovations are traditionally protected via mainstream IP mechanisms such as patents. In order to protect design-based innovations, design registrations reveal to be most used. A design registration consists of a set of sketches – i.e., the form – of a new object. The form is an expression of both the aesthetic component (how the object *appears*) and the functional component (how the object *functions*, its ergonomics). This feature of design registration can give visibility to new designs, and thus trigger further value generation. At the same time, it may weaken the protection for two main reasons. First, product forms are often modified by little, ‘just enough’ to avoid infringement; second, when the form is not particularly articulated, that is, when it is simple. For instance, in the case of kitchen aspirators we were explained that, when the design is simple, such as a square or a circle, design registration is perceived as having little effectiveness, since “you simply cannot extend intellectual property on geometry”. As a firm manager reported, the difficulty with design registrations as a means of effectively protecting design is linked to the fact that design innovation acts “in the middle between technology and geometry”.

Notwithstanding companies are not confident about the effectiveness of design registrations to protect their design innovations, they often use them. This emerged from our direct interviews with the firms and was also confirmed by the IPRs consultant company included in our sample. In line with the contribution of Gemser and Wijnberg (2001), who argue that firms exploit reputation mechanisms to appropriate the value of their design

innovation, we find that firms tend to use design registrations in order to establish ownership. This increases their reputation as they can claim to be the first to have introduced a new design. However, while companies tend to rely on IP to establish ownership and avoid imitation, design consultants would not agree. In fact, designers tend to be happy when their products are copied, since this increases their reputation. This is consistent with the case of art whereas artists are happy to have many imitators in order to become the founders of some movements (Wijnberg and Gemser, 2000). For all of the above reasons, firms are more inclined to protect their intellectual property, while designers tend not to. There are also other reasons explaining why companies use design registrations. First, the cost of registering a new design solution is extremely low when compared to patents. The procedure is faster, little administrative activity is needed, and the fee is low.⁸ In addition, most of the firms use the so-called “multiple registration”: EUIPO’s regulation on design registrations allows including more than one model within the same application, reducing considerably the cost and time for the firm. Another common feature is that firms use design registration in the markets where they export their products. Usually they first register the design in Italy or Europe, and they later decide whether to extend the registration abroad. Given the interconnections between design and technology in some industries, we also find that firms use both design registrations as well as patents to protect the same product. In principle the strategy is quite simple, given the difficulty of obtaining a full protection from either patents or design registrations, firms try to “build a protective belt around the products” using every available means. This is done in particular in industries in which the design of a product is closely interlinked with the technological part, as for instance in lightening design and kitchen hood sectors.

Some of the interviewed firms are involved in trials for design registration infringement. However, as the IP consultant company explained to us, nearly all these cases are resolved outside the courts thus avoiding a trial.

4.2 Non-IP mechanisms of appropriation

To a similar extent of patents, firms do not consider intellectual property as the most effective tool for appropriating the returns of innovation design investment. Therefore, firms put in place a number of non-IP strategies to capture returns from their innovative activities.

⁸ For example, in the case of a single design application at the EUIPO, the applicant will need to pay a registration fee of €230 and a publication fee of €120 for a total of €350.

An important strategy adopted by firms to capture profits from their design innovation resulted to be *lead time* advantage. It is argued that, possibly, the best protection with respect to design is developing new solutions on a continuous basis. The first mover in introducing a particular design innovation could exploit two different advantages. Firstly, similarly to the case of technological innovation, being the first gives the firm a temporary monopoly. However, consistently with the fact that inventing around is quite easy as already clarified above, a second typology of lead-time advantage emerges as a specific feature of design innovation. In the world of design, a successful design is always associated to the firm – and designer – who introduced it in the first place. Should other competitors introducing very similar products, they will be perceived as mere copies of less value. To this respect, being the first to market seems to be more important in industrial design compared to technology because it triggers a reputation effect that reduces, at least in the short term, the risk of being imitated (e.g., Gemser and Wijnberg, 2001). Claiming authorship is not only a formal matter obtained through intellectual property, as described above. Firms also claim ownership of their new products by exhibiting their products to their customers and wider market, typically during international fairs or exhibition events. More generally, communication tools that include also specialised journals and advertisement and are associated to a new design are important means of claiming ownership on new design solutions and exploiting a lead-time advantage. This mechanism however tends to be limited to the cases in which competitors operate in the same market segment. By contrast, they are less effective in the case of competitors coming from emerging countries such as China, where firms target low-end market segments where cost reduction is the main source of advantage. In these cases, the other mechanisms described below tend to be more effective.

The other mechanisms that play a role in firms' attempts to capture returns from their design innovation activities can be assimilated to what the innovation literature refers to as complementary assets (Teece, 1986). Complementary assets include any activity that gravitates around the core innovation such as distribution channels, reputation, marketing capabilities, strategic alliances, customer relationships, licensing agreements. We found that the main complementary assets on which firms rely are linked to their specific production techniques and manufacturing capabilities, thus confirming the great prominence of the production process for industrial design. First, we found that cost and quality of the materials constitute key complementary assets for the firms in object. For instance, *Teuco Guzzini*, for the interior design of their bathrooms, have employed a type of glasses that had previously been used in the production of sports helmet visors and the construction of skyscrapers.

Second, some of the sampled firms have meticulously integrated handicraft skills within their manufacturing processes. Both *Fendi* and *Poltrona Frau* managers emphasised how their manufacturing capabilities have played a key role in maintaining a leadership in their industries and capturing returns from their innovative efforts. In these industries, in which handicraft still plays an important role, the manufacturing capabilities represent the central complementary asset. To this regard, the linkages with specialised suppliers can be very important.

Regarding both handicraft and the presence of specialised suppliers, the role of location factor has to be emphasised. In fact, firms rely on and nurture, specific competencies that are extremely localised in their territory, and that are the result of knowledge accumulated over decades and in some cases centuries. For example, in the case of *Poltrona Frau*, we were explained that they can rely on competencies in the leather tanning process that goes back to the Renaissance. In a similar vein, location is also important for the role played by specialised suppliers. As in the case of the kitchen aspirator industry, both *Elica* and *Faber* are located within the mechanical industrial district in the area across the region Umbria and Marche, where kitchen hoods are produce since 1958. This has spurred agglomeration of specialised suppliers which represent a key source of innovation for kitchen hood companies. To this regard, we argue that geographical location represents another important ‘mechanism’ allowing firms to profit from innovation as it allows to benefit from external economies, namely access to local knowledge and competencies which are not available to competitors based elsewhere and thus less likely to be imitated.

Finally, our interviewees admitted that investments in the production techniques and processes constitute another complementary asset. The necessity to initially invest large amounts to set up the production of a new product has been underlined by several firms within our sample, which were manufacturing boats and kitchen aspirators or specialised in interior design. As an example, a manager from *Teuco Guzzini* explained to us that a very distinctive feature of their products is that they are extremely polished. This is due to a particular production technique, the injection presswork, which requires “a very expensive 5,000-ton press”. In the case of kitchen hoods, a firm’s manager told us that a very effective way of protecting a design is to leverage on the technical difficulties attached to its reproduction. In several cases, designs can be so peculiar that they require specific equipment and large investments to reproduce them. In a nutshell, he argued that “not everybody would be willing to invest €2 millions to realise the same design”. Table 3 summarises both the IP and non-IP strategies.

--- Table 3 about here ---

4.3 Trust to appropriate innovation generated through design collaborations

Both firms and designers interviewed have confirmed that the externalisation of design activities is by and large increasingly diffused. Consistently with a growing trend in the domain of design-based innovation, companies prefer to rely on external designers since they can benefit from cross-fertilisation and technology transfer (Kim and Lee, 2016; Love and Roper, 2015). Since most of the sampled designers operated within different industries, we could observe how firms' design innovations benefited from cross-industry transfer of technologies or other solutions (e.g., materials and production processes). This phenomenon however may pose some challenges on firms' ability to fully appropriate the value from innovation: how can companies ensure that they appropriate returns from innovation when the main source is located outside the firm's boundaries as in the case of design consultants?

Our empirical evidence points to one major mechanism whereby firms implement to hold some degree of ownership over their design output, that is, trust. Trust has been largely emphasised as a key component of the relationship between companies and design consultants. We found that trust is built by means of long-term relationships, continuous interaction, and knowledge sharing.

When designers were asked about the conditions for successful collaboration with the firm, they stressed the importance of having a profound knowledge of several aspects of the firm which can be grouped into two: technical factors (e.g., production process and techniques, materials employed, etc.) and marketing strategies. It has been argued that a necessary condition in order to deliver a good project is that a designer first needs to be familiar with various characteristics of the firm such as the catalogue, the distribution system, the competitors, the reference market, the productive potential and, lastly, the economic potential (if and how the management team is willing to invest). Behind every project there is the work of collecting all this information which, according to a designer, 'is equal to about seventy per cent of the final effort'. Continuous interaction between the designer and the firm throughout the development process is another essential component of building trust over time. Consistently with other studies (Ravasi et al., 2008), we found systematically across the whole sample that external designers work in tandem with the product development

department from the very beginning of the conceptual phase up the engineering of the production. This is considered as fundamental for both companies and designers.

We found that in virtually every sector companies this process of knowledge sharing and interaction is a fundamental vehicle to build trustworthy collaborations between firms and designers. Trustworthy collaborations are the result of a process in which successful projects reinforce trust, which in turn spurs new collaborations leading to a greater amount of knowledge-sharing over time. Eventually, repeated successful collaborations end up with *long-term* relationships in which the amount of knowledge shared is maximised. Companies tend to engage in relationships lasting more than ten or fifteen years with designers extremely specialised in their sector. An interesting and more complex strategy is the one put in place by the typical design-driven firm, the lighting company *Nemo (Cassina Group)*, which has a long-standing tradition in interior design. Nemo has established a three-tier strategy: (i) long-term team of designers; (ii) some “big name” like the “*Foster Studio*”; and (iii) emerging designers. The firm consider part of the first category those designers who are responsible for the bulk of their new products; by engaging with ‘big names’, the firm seeks to flag out products that are exhibited in internationally renowned sector fairs, are produced in limited numbers, and will ideally set a trend. Finally, the third-tier strategy represents an attempt to introduce innovative design solutions by looking at young talents and assuring a turnover over time. The interviewee emphasised that the aim of this strategy is to induce young and emergent designers – different for their cultural and educational background – to benefit from each other’s diversity. Furthermore, the strategy allows the firm to balance the tension between the need to preserve coherence and consistency within their different designs and the need to foster creativity through the introduction of fresh ideas from outside.

Therefore, trust is built over time as a long-term process of mutual understanding and learning grounded on continuous interaction between the designers and several internal functions of the company. To further strengthen their relationship, firms establish contracts that include exclusive rights of collaboration. Whilst it is very common for designers to collaborate with firms across many industries, a firm may require that the design consultant collaborates with no direct competitor within the specific industry. Some firms may also ask their designer not to start a new collaboration with competitors for a certain period of time after their collaboration is terminated. In this way, companies can benefit from the cross-fertilisation activity of designers because of their involvement in several industries as well as establish a solid exclusive collaboration with them.

5. Discussion

This paper addresses the issue of appropriability in design-based innovation across several manufacturing industries when companies collaborate with external designers. Whilst being aligned with extant research on appropriability of technological innovations, our findings also point to firms' increasing attitude to rely on means of intellectual property rights protection different from those established within the literature. The mechanism of signalling ownership by means of IP arises as peculiar in design innovation compared to technological innovation. To this regard, the empirical evidence illustrated above has also drawn attention to how firms and designers are exposed to a different set of incentives for IP protection: the former tend to embrace with legal barriers, and deal with them as appropriate; the latter prefer to disregard them. In the same vein as technological innovation, we observe that companies prefer lead-time advantage and complementary assets as more effective strategies. Our findings reveal that some of these mechanisms are *industry-specific*. For instance, the quality of craftsmanship is relevant in the furniture industry, while the importance of high fixed capital investment arose for interior design such as kitchen hood, bathtubs, and showers. Instead, continuous innovation and lead time was highlighted in the lighting industry and the fashion industry.

Our study also provides insights on the firms' ability to appropriate value from their design-based innovations through a focus on the relationship between companies and design consultants. Despite recognising that designers should maintain their independence and autonomy, firms find the presence of some degree of convergence between firms and designers as necessary for managing the knowledge that is generated outside of the firm, and thus, the long-term success of the collaboration. To this regard, long-term collaborations grounded on trust are built to allow aligning firm-specific objectives - such as strategic vision, mission, and marketing strategy - with those of the designers. The findings earlier illustrated draw attention to how the collaborations between firms and external designers may be open to share deep and valuable knowledge with each other. The ultimate outcome is an exclusive relationship between the two parties, which give firms the possibility to better appropriate the value of their innovations and maximising value extraction from the relationship. To this regard we have not detected differences across the industries: when companies prefer the externalisation strategy, they all seem to build it according to the process described above. Interestingly, our case study also suggests the importance that firm location may have. Many of the complementary assets described above depend to the

presence of specific competencies and tacit knowledge that are attached to the territory where the firms are located. This speaks to the location theory, in particular the one on Italian industrial districts, by adding up the appropriability issue as a further positive outcome that stems from local external economies (Aage and Belussi, 2008; Becattini, 1987).

The conceptualisation of trust hereby proposed resembles the way in which the construct has developed within organisational studies. Trust has been considered extremely relevant within collaborations across organisational boundaries, in that it refers to positive expectations that the partner will not act opportunistically, thus significantly maximizing returns from collaboration by reducing negotiation costs, risk of betrayal, transaction costs and search costs (Thorgren and Wincent, 2011). Consistently with the dynamic model developed by Mayer et al. (1995), our evidence shows that trust arises as a dynamic and reinforcing process through personal interaction and close collaboration between designers and the relevant functions of the firm, in which trust is enhanced as a result of positive collaborations. A previous successful collaboration increases the level of trust; this in turn encourages both the firm and the designer to take more risk, that is, both parties are inclined towards sharing more knowledge, collaborating more closely, and a longer-term commitment (Colquitt et al., 2007; Mayer et al., 1995). The outcome of the trusting behaviour affects trust indirectly through the perception of some characteristics of both the firm and the designer, e.g., skills and integrity. In the case of the designers, other characteristics were mentioned as factors of perceived trustworthiness: predictability, firm-specific, and sector-specific knowledge, which in turn reduce substantially transaction costs. We find insightful reporting what a firm manager stated while referring to their main designer: “We do not even need to talk to her, she already knows what we want, what we need, how we work, and which our main marketing strategies and competitors are”. With trust emerging from and, at the same time, driving these repeated collaborations, the (successful) relationship firm-designer tends to be long-term in nature. As a result, we argue that the relationship between firms and design consultants constitutes a peculiar form of collaboration, and more specifically a long-term process of mutual understanding and learning that is grounded on close interaction and trust.

Compared to organisational research on trust, we have particularly emphasised the role played by knowledge sharing. To this regard, our evidence reinforces previous research about the importance of non-market mechanisms, and in particular trust, as effective means of regulating knowledge-intensive forms of collaborations (Adler, 2001). Since knowledge-sharing is a form of social dealing among individuals, those involved may be reluctant to share knowledge if they are reluctant to trust each other (Riege, 2005). Long-term processes

of building trust have been therefore considered by some scholars as a major precondition for knowledge exchange (Roberts, 2000; Rolland and Chauvel, 2000). The service innovation literature has also drawn attention to the importance of an active collaboration between service providers and service users for the aims of better firm performance. It has in fact been argued that a degree of “openness” within the relationship (Love et al., 2011:1439) along with connectivity in innovation may facilitate the development of trust and mutual learning (Creed and Miles, 1996). Our research refreshes this debate by questioning how firms tackle the challenges attached to value appropriation in the case of these ‘open collaborations’. In particular, the findings illustrated above underscore how firms tailor their appropriation strategy to the nature of the relationships with design consultants depending on the temporal dimension of these relationships or the level of trust that characterise them.

6. Concluding remarks and future research avenues

Capturing value from design-based innovation presents firms with some challenges, which only recently academic has started addressing. There is agreement that firms operating within design-intensive industries tend to collaborate with design consultants (freelancers) rather than designing their products internally. Extant research on the appropriation of innovation has identified a number of formal and informal barriers that prevent imitation. This paper explored the protection mechanisms that firms set up to reap the benefits of new product designs; because design-based innovation often originate across organisational boundaries, the appropriation of innovation presents new and interesting challenges, which are design-specific and quite unexplored.

Drawing on a multiple-case study, we highlighted several aspects that are distinctive of innovation design. First, we find that appropriability mechanisms can be industry-specific and as such give firms the possibility to tailor their innovation and appropriation strategies accordingly. Second, this research pointed out how the nature of the collaboration between firms and design consultants affects firms’ chances to benefit from design-based innovation. Relationships based on long-term commitment and trust seem to allow firms to internalise over time the value of knowledge that is generated across organisational boundaries. In this respect, this paper enters a promising research avenue related to the study of Italian industrial system: whilst this latter has long been known for its heavy reliance on territorial informal inter-personal networks (e.g., industrial districts), future research could explore whether similar appropriability mechanisms emerge and develop in other countries. Second, while we

focused on medium and large firms, which are likely to have specific resources and engage in long-term collaborations with external designers, it would be interesting to examine how small firms tackle issues raised by appropriability. Furthermore, while we analysed cases of successful collaborations, it would be interesting to analyse cases in which appropriability was hampered because of dysfunctional relationships. Finally, we only briefly illustrated the role played by specific contractual agreements between companies and designers and thus encourage more research on these aspects in conjunction with extant literature about contract design and incentives-based mechanisms.

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Tables and Figures**Table 1: Interviewed Firms included in the sample (face-to-face interviews)**

Firm	Industry	Firm size (no. employees)	Brief description
Elica	Kitchen hood	~3,000	Elica is a multinational group with affiliates in Germany, Poland, Mexico, India and China.
Faber	Kitchen hood	~1,800	Faber is present in 3 continents, with 7 plants in 6 countries: Italy, Sweden, France, Turkey, India and Argentina.
Poltrona Frau	Furniture	~1,000	Poltrona Frau is part of the Cassina group.
Teuco Guzzini Spa	Bath interior design	~500	Teuco has plants in Italy, UK, France, Spain and Russia.
Guzzini Lighting	Lighting engineering	~1,000	Guzzini Lighting has plants in several countries in Europe, China, Singapore, Hong Kong, Russia, Dubai, North America, Turkey.
Fendi	Fashion	~3,000	Fendi has branches in Europe, the U.S., and Asia, and nearly 200 stores worldwide.
Canados International	Boat	~200	Canados has a plant in Italy.
Nemo – Cassina	Internal lighting	~50	Nemo is part of the Cassina group, has a plant in Italy.
Luceplan	Internal lighting	~500	Luceplan has branches in Italy, Denmark, France, Germany, and the U.S.A.
Abet Laminati	Laminates for buildings exteriors	~1,000	Abet Laminati has plants in Italy and the U.S.A..

Table 2: Interviewed design consultants (face-to-face interviews)

Design consultant	Area of specialisation	Date and duration
Giovanna Talocci	Interior design	15 September 2008 (4 hours)
Fabio Lenci	Interior design	12 October 2008 (4 hours)
Corrado Terzi	Lightening design	4 April 2009 (3 hours)
Cecilia Cecchini	Materials	22 November 2008 (3 hours)
Carlo Martino	Materials	23 November 2008 (3 hours)
3eLab – design consultants	Boat industry	19 January 2009 (2.5 hours)
Saung Sook Kim	Interior design	15 April 2009 (3 hours)
Mani Frers	Sailing boat	12 February 2009 (2.5 hours)
Barzanò & Zanardo	IP consultancies	28 September 2009 (2 hours)
Federico Cedrone	Interior design	13 February 2009 (3 hours)

Table 3: The firms' strategies to capture profits from design innovation

Strategy	Description
IPRs – design registration	<ul style="list-style-type: none"> • Largely diffused but not considered effective to protect design innovation • Mainly used to “claim ownership”
Lead-time advantage	<ul style="list-style-type: none"> • Temporary monopoly • Strong association between the design innovation and the firm
Specific production techniques and investments	<ul style="list-style-type: none"> • Cost and quality of the materials • Handicraft skills well integrated within firms' manufacturing processes • Large investments in fixed capital