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FEATURES AND EFFECTS OF INTELLECTUAL PROPERTY RIGHTS IN INTERNATIONALIZATION

ABSTRACT

Intangible assets facilitate successful international growth and, likewise, new value can be created through internationalization as it supports creating and utilizing such assets. Independent of whether the innovative creations are input or output, in order to preserve the benefits, awareness of the threat of imitation is needed. Departing from prior studies concentrating on patenting and copy-prevention, or taking the relationship between intellectual property right (IPR) protection and internationalization as given premises, this study addresses the features and effects of IPRs in internationalization from a more strategic perspective. Analysis of data from 299 companies provides empirical evidence.

Key words: internationalization, innovation, knowledge protection, imitation, intellectual property rights

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INTRODUCTION

Yeniyurt, Cavusgil, and Hult (2005: 2) state that “having a global orientation is no longer a luxury, but a necessity for economic survival in a large number of countries.” In line with this, internationalization has been linked to various activities of firms, including innovation activities. For example, according to Zahra and George (2002: 262), companies that “internationalize their operations in innovative and creative ways stand to achieve significant gains that go beyond superior financial performance.” Innovation may not only promote successful internationalization, but it also represents the outcomes of such activities: for example international networks of innovation foster the speed, efficacy, and effectiveness of innovation while also limiting the related risks (Nambisan, 2005). The superior performance cannot be taken for granted, however. The combination of internationalization and innovation may at its best be a source of higher performance and growth, but it requires careful management. Pla-Barber and Alegre (2007: 276) note that “firms can overcome some international risks if they have a particular competitive advantage that differentiates them from indigenous competitors” (See also Rodríguez and García Rodríguez, 2005). This means that making sure that the competitive advantages and valuable intangible assets do not leak to competing organizations can be quite relevant. However, this is not an easy task with innovation—and the related protection of intangibles—being a balancing act between sharing and transferring adequate amount of information and knowledge, and keeping (potential) competitors from imitating them in a way that causes problems. Therefore, it is relevant to know what the relationship between intellectual property rights (IPRs) and internationalization is, particularly with regard innovations and the related intangibles.

Regarding the issue of creating obstacles to unwanted imitation in relation to internationalization activities, especially patents have been examined widely (Yang, 2012). However, in these studies, patents have often been treated as an environmental macro factor (e.g., Luo, 2001; Chung and Beamish, 2005; Allred and Park, 2007), even if they actually can be used by firms as strategic tools (Hurmelinna-Laukkanen and Soininen, 2011). Also, concentration on patents has led to overlooking other IPRs that may be relevant in several industries where relying on patents as fully as in other sectors is not possible (consider, e.g., services vs. manufacturing, chemical industry). Prior research also often lacks consideration of different dimensions of IPRs, which is quite notable as, for example, availability, protective strength and competitive efficiency of the IPRs can be quite different things (Hurmelinna-Laukkanen, 2009).

This study tackles these issues that may easily be overlooked but that still are important both in terms of supporting internationalization of an innovative firm, and fostering and maintaining the benefits and competitive advantages gained through internationalization activities. In particular, this study examines how IPRs relate to internationalization. The aim is to find out, first, whether availability, strength, and use of IPR protection differ between domestically and internationally operating firms, second, whether IPRs are related to internationalization tendencies, and finally, if IPRs yield international performance benefits. Answers to these questions augment the extant knowledge and provide ground for making strategic decisions on how to approach IPRs in relation to internationalization activities. After a theoretical discussion, analysis of data from 299 Finnish companies provides empirical evidence on the relationships of internationalization and the use of intellectual property rights. Discussion and conclusions summarize the findings and managerial implications, limitations, and future research areas.

THEORETICAL BACKGROUND AND HYPOTHESIS DEVELOPMENT

Intellectual property rights may prove to be relevant in different stages and areas of internationalization. For example, they can improve the possibilities of firms to enter new markets with innovative products and services as it is safer for the firm to do so, or, if IPRs are used to “advertise” the expertise of the firm, it may enable reaching needed partners. Furthermore, companies may gain different benefits after establishing international activities, as IPRs may allow reaping higher profits from innovation or foster gaining new knowledge assets that can be used for further innovation. These things do not happen automatically, however, and certain basics related to IPRs, innovation and internationalization need to be understood. The following discussion touches these issues.

Internationalization and innovation intertwined—Basis for the need of IPRs

Globally spread competition, convergence, uncertainty over technological trends and increasing vagueness of industrial boundaries are recent trends guiding the strategies and operations of firms. Accordingly, challenges related to globalization and dispersed value chains have touched many organizations in different fields (Nambisan, 2002; Perks and Jeffery, 2006). The depth with which this happens is reflected in the current knowledge on internationalization, starting with conceptualizations. Despite all the research done around

internationalization (for reviews see e.g., Miesenbock, 1988, and Leonidou and Katsikeas, 1996), there still does not seem to be a generally adopted definition for internationalization. Internationalization has been defined, for example, as “the process of increasing involvement in international operations” (Welch and Luostarinen, 1988: 36) or as “the process of adapting firms’ operations (strategy, structure, resources, etc.) to international environments” (Calof and Beamish, 1995: 116). In this study, the first definition is used as the starting point. Here, the process itself is not really of interest, but involvement in international activities—in a wide sense covering varying entry modes (export, licensing, collaboration, direct investments) and activities (sales, production, R&D)—is relevant.

Many organizations start internationalization activities when they are looking for larger markets, firm growth, and better profitability (e.g., Nummela, Puumalainen, and Saarenketo, 2005). Internationalization can happen in various ways, some taking more time and resources than others. Prior research has discussed process or stage models of internationalization (see e.g. Johanson and Wiedersheim-Paul, 1975) based on earlier theories on the growth and behavior of the firm (Penrose, 1959; Cyert and March, 1963), foreign direct investment (FDI) theory (Pla-Barber and Alegre, 2007), and the network approach (Johanson and Mattsson, 1988; Coviello and Munro, 1997; Holmlund and Kock, 1998; Zander, 2002; Perks and Jeffery, 2006). Irrespective of the adopted mode of internationalization, augmenting the organization’s opportunity for value creation is often a central goal for firms (Lu and Beamish, 2001; Baughn, Stevens, Denecamp, and Osborn, 1997; Chesbrough, 2003; Frenz, Girardone, and Ietto-Gillies, 2005). Therefore, internationalization is in many cases more or less tightly connected to innovation activities aiming for the same target. Cantwell (1995), for example, notes that innovation can be transmitted inside the firm boundaries from country to country, improving the possibilities to reach foreign markets (see also Manolopoulos, Papanasrassiou, and Pearce, 2005), and that multinational companies can learn from the local environment, which enhances further innovation—especially if the firm is located in a country with high innovation rates and technology-intensity (Gupta and Govindarajan, 2000; Salomon, 2002). In fact, many studies have illustrated the relationship between internationalization and propensity to innovate, and have noted that R&D activities are becoming increasingly international (Criscuolo, Narula, and Verspagen, 2005; Frenz et al., 2005; Carlsson, 2006).

However, *ex ante* concerns about the outcomes of internationalization and the considerations about how likely the firm is to capture the advantages provided by

expansion are guiding the decision making (Martin and Salomon, 2003). For example, it has been stated that closely held entry modes such as foreign direct investment (wholly owned subsidiaries, for instance) should be used for internationalization when misappropriation is possible (Buckley and Casson, 1976). Indeed, the fear of losing core intangibles (related to innovations of the firm) may be one notable guide with regard to internationalization: It has been noted that endogenous location advantages can be reached as innovation activities of firms generate spillover effects that benefit the local environment (Gupta and Govindarajan, 2000; Salomon, 2002), but these spillovers may also be undesirable for the innovating and internationalizing firm. In line with this, the possibilities to control knowledge flows should play a role. This brings knowledge protection and intellectual property rights into the equation.

Maintaining leading edge in innovation and internationalization

As suggested already above, “deploying intangible knowledge-based assets is required for successful international expansion” (Martin and Salomon, 2003: 356). Value can be created if the firm possesses distinctive technological, marketing, and managerial capabilities to carry out internationalization in an efficient and successful manner (see e.g., Dunning, 1993; Caves, 1996; Yeniyurt et al., 2005). Nevertheless, having those capabilities at the firm’s disposal is not enough, but they need to be kept away from competitors’ reach so that the uniqueness of the assets and capabilities is not lost (Rodríguez and García Rodríguez, 2005). Of course, in international settings, outbound knowledge flows may be inherently restricted (Feldman, 2000; Carlsson, 2006), and a lot of information and knowledge may be quite safe from imitation. Especially tacit knowledge (as opposed to codified, explicit knowledge), may be very hard to transfer in international settings as language and cultural differences, for example, further limit the chances to capture ideas that are inherently difficult to communicate in the first place (see e.g., Teece 1977; Kogut and Zander, 1993; Martin and Salomon, 2003, on the relevance of tacitness for multinational companies). Physical distance increases costs related to knowledge transfer, and has an effect on communication in terms of quality and frequency (von Zedwitz and Gassman, 2002). Moreover, collaborative activities, both within the firm and between organizations (considering the network approach to internationalization in particular), include difficulties related to national differences: It has been shown in prior research that not being familiar with each other’s characteristics, routines, and practices, the

collaborating actors face problems with greater potential for misinterpretations, disagreements, and need for compromises (Davenport, Davies, and Grimes, 1999; Heimeriks, 2002; Makela, Kalla, and Piekkari, 2007).

Nevertheless, as valuable intangible assets are likely to attract interest – and imitation, it should not be taken for granted that the intangibles are safe without any particular actions. Besides, knowledge protection is not just about preventing harmful imitation, but utilizing intangibles effectively. Therefore, some premises of protection against imitation are worth acknowledging.

Protecting intangible assets

Several means of protection have been identified in existing literature that enable a firm to avoid, or at least postpone harmful imitation of its intangibles (including its innovations). Studies on appropriability and appropriability regime (see Teece, 1988, for the original construct covering just IPRs and tacitness) have discussed the role of labor legislation and contracts (Hurmelinna, Kyläheiko, and Jauhiainen, 2007), tacit nature of knowledge (Polanyi 1966; Lippman and Rumelt, 1982; Barney 1991; Zander and Kogut, 1995; Teece, 1988; Saviotti, 1998), lead-time (Levin, Klevorick, Nelson, and Winter, 1987; Lieberman and Montgomery, 1988; Makadok, 1998; Carow, Heron, and Saxton, 2004), human resource management (HRM) (Baughn, Stevens, Denecamp, and Osborn, 1997; Liebeskind, 1997; Boxall, 1998), and practical and technical means of concealment such as passwords and (physical) access restriction (e.g., Davis, 2001; Hannah, 2005) in diminishing knowledge leakages and, subsequently, enabling profiting from innovative activities. For example, with HRM practices it is possible to keep key employees from leaving the firm, labor legislation allows making non-competition contracts and prevents communication of trade secrets, and lead-time achieved through continuous innovation and by moving first slows down the harmful effects of imitation. Intellectual property rights, especially patents, have been in the center of the discussion on protection and appropriation. They are also acknowledged as an increasingly relevant element in international business (e.g., Jain, 1996; Arundel, 2001; Cohen, Goto, Nagata, Nelson, and Walsh, 2002; Gallini and Schotchmer, 2002; Hannah, 2005; Yang and Clarke, 2005). IPRs including patents, copyrights, trademarks, trade name, model rights, and other such institutionally established rights provide the rights holders a possibility to create a temporary monopoly. This enables them to benefit from higher profit margins because competitors cannot freely compete with the same or essentially similar offerings.

Furthermore, the rights owner has another channel for higher returns at its disposal: Since the firm with IPRs can (in the best case) efficiently control the knowledge assets, it is possible for it to get ancillary revenues through selling, licensing, or franchising (Hurmelinna-Laukkanen, 2009). All in all, the wider and stronger the protective fence is, the more the firm has freedom considering the opportunities to decide how to utilize the IPRs. Indeed, IPRs can function as an effective vehicle for exchanging intangible assets and transferring them safely from one economic setting to another. This applies to internationalization as well.

Examination of the relationship between knowledge protection and internationalization

Kogut and Zander (1992) have illustrated that tacitness of knowledge is positively associated with the potential gains from exploiting knowledge abroad, and that the main reason behind this is the fact that tacitness makes imitation very hard, subsequently improving the potential of such knowledge to generate distinctive competitive positions. This idea can be applied to IPRs as well: a strong protective fence protects company-specific intangibles, which makes it easier to capture benefits from international markets—either through preventing others from using the core intangibles, or through controlling the ways in which others can do so (Hurmelinna-Laukkanen, 2009). Consequently, it seems quite obvious that IPRs play a role in internationalization, and this issue has been addressed in prior studies to some extent. However, particularly concentrating on patents and approaching IPRs as something that is quite external to the firm—as an industry or market feature—has left its mark on the existing knowledge, and further examination is warranted. In fact, the actions and perceptions of the firms with regard IPRs may be quite relevant. For example, if managers in a firm consider it excessively hard for the firm to acquire IPR protection abroad, or if they are worried about existing IPRs owned by other organizations in the foreign markets, concerns about availability of protection may limit the tendency to internationalize. It does not necessarily matter if the risks related to imitation or litigation are real, but mere expectations may guide internationalization. Likewise, if the firm does not have experience in or “culture” of utilizing IPRs, it may have hard time entering foreign markets. As little is known about these things, such aspects are examined in the following by relying on various streams of literature and by taking a somewhat exploratory approach.

IPRs in domestically and internationally operating firms

The first issue to be considered when IPR protection is established is whether IPRs can be obtained in the first place. In other words, availability of IPR protection is of concern. Moving to international markets, IPRs need to be acquired in different countries, which calls for resources for increasing registration fees, and for utilizing (local) expert help, for example. On the other hand, harmonization and international treaties have made the rules of the game more uniform, which means that acquiring IPR protection should not be overwhelmingly difficult compared to filing for rights in the home country, for instance. In general, gaining appropriate protection should be manageable, and it may be that availability of the IPR protection is not the deciding factor when internationalization is considered. However, this issue calls for confirmation.

Availability of IPRs is only one part of the story, however, as the protection mechanisms also need to prevent imitation in practice in order to have relevance. Because of cultural and national differences, for example, there are likely to be differences in the protective strength of institutionally established IPR protection in different countries and markets. There may be different chances to enforce rights in courts and practice, for instance. Sometimes IPRs may be circumvented, or it may be that officials judge them invalid, in which case protection is not really strong in the protective sense. Complexity increases as more markets are targeted, and challenges in terms of gaining strong enough protection are obvious when local firms often have better knowledge about the business environment, legislation, and other such features, and consequently, may have upper hand in these issues (Calvet, 1981). Local firms are at an advantage especially if the institutional setting is weak and protection is rather achievable through networks that reach political leaders, than through the IPR system or courts. Nevertheless, the international operations environment can also prove to be helpful: it has been found that emergence of radical innovations is associated with multinationality (Frenz et al., 2005), and such innovations often benefit from stronger IPR protection than incremental ones (see Tushman and Anderson, 1986, on different types of innovation): radical innovations are easier to protect than incremental ones not only because it is easier to meet the novelty requirements related to many IPRs, but also because it is easier to determine—in case of infringement claims—whether the radical innovation diverges from the other creation (Levin et al., 1987). Shortly summarized, it can be expected that internationalized firms may benefit from stronger IPR protection than firms that operate in domestic markets because the characteristics of their innovations enable that. Another issue potentially improving the

strength of protection in relation to internationalization is that preparing for internationalization may bring knowledge transfer and protection issues under close scrutiny, with stronger protection mechanisms searched for more actively (Autio, Sapienza, and Almeida, 2000). When a firm operates in domestic markets only, it may not have such need or incentives to update its IPRs.

Also the experience in using IPRs in general may be related to internationalization. While extensive use of protection itself is not a direct indicator of success (it may be that the most critical innovations are not covered for one reason or another—and, in general, it is typically only a small fraction of IPRs that ends up being essential: if a firm manages to protect just one important product it may have all the protection that it needs but such a situation is rarely enduring), IPR protection makes it easier for the firm to act and react in different situations. In turbulent markets it may be that certain technologies, processes, products or services become obsolete or very important quite suddenly, and if those that turn out to be valuable are not covered with protective mechanisms, the firm may not reach its full potential. Since international markets may exhibit more dynamism than domestic markets (due to, for example, the fact that there are more different actors involved), varying protection mechanisms may be needed. Besides, IPRs, as noted, can be used in different ways—some for preventing copying, and others for generating ancillary revenues or for gaining access to distribution channels or relevant intangibles, for example (Hurmelinna-Laukkanen, 2009). When the company has readily a wide range of IPRs at its disposal, it can better choose right strategic moves.

This discussion provides the starting point for closer examination of the relationship between IPRs and internationalization. First, the differences between domestic and international firms can be scrutinized. The above considerations suggest that if firms in domestic and international markets find IPRs different in terms of availability and protective strength, and if the firms are different regarding the use of IPRs, it is likely that IPRs are related to internationalization activities. In order to examine this, the following set of hypotheses is put forward:

Hypothesis 1a: Availability of IPRs is similar for internationalized and non-internationalized firms.

Hypothesis 1b: IPRs are perceived stronger in internationalized firms than in firms operating in the domestic market.

Hypothesis 1c: IPRs are used more in internationalized firms than in firms operating in the domestic market.

The role of IPRs in internationalization tendencies

The mere differences between domestically and internationally operating firms do not tell the whole story about IPRs, however. Concentrating on the use of IPRs, for instance, the existence of the hypothesized differences might surely indicate, as already briefly suggested above, that firms that are used to utilize IPRs are more likely to internationalize (e.g., because IPRs enable that), or that IPRs provide them with incentives to operate in foreign market in the form of such a beneficial situation that improves performance in international markets. Whether one or both of these effects occurs has not been thoroughly examined in existing theoretical discussions.

First, the effects of the IPR use on the likelihood of a firm to be internationalized can be evaluated. As suggested, IPR protection may exhibit such characteristics that enable internationalization. In such a situation, the IPRs may indicate high quality of the firm's offerings which attracts customers and partners (see Kuivalainen, Kyläheiko, Puumalainen, and Saarenketo, 2003, about the positive relationship between patent protection and collaborative internationalization activities), and they may enable the firm to start operations (sales, production, R&D) safely, without the fear of other organizations' actions such as infringement claims. Consequently, the following hypothesis is drafted:

Hypothesis 2: the more actively a firm uses IPRs to cover its products and processes, the higher the likelihood to internationalize is.

The role of IPRs in international performance

The relationship between IPRs and likelihood of being internationalized might be more interesting for academics than practitioners. Of course, managers should benefit from knowing whether IPR usage can enhance international entry, but even more interesting question is, if IPR protection is beneficial for the internationalized firm after it has established its operations abroad – this is the second area of examination.

In prior research it has been noted that mere existence of strong protection does not necessarily mean that the innovation or knowledge covered by it is a source of competitive advantage (Hurmelinna, Kyläheiko, and Jauhiainen, 2007; Teece and Pisano, 2007; Hurmelinna-Laukkanen, 2009). Excessive protection may turn out to be harmful if

it prevents knowledge transfer in situations where it would be needed (Teece, 1977; Kogut and Zander, 1992). Martin and Salomon (2003), for example, have noted that tacitness of knowledge turns harmful in internationalization above a certain threshold level. Considering IPRs, preventing knowledge flows is mainly a question of strategy, however, as protective emphases can be removed to allow safe knowledge exchange instead – in the case of tacitness, the obstacles to knowledge transfer are harder to remove (Hurmelinna-Laukkanen and Puumalainen, 2007). To enable strategic moves, the starting point needs to be in using protective measures widely enough: When the value of intangibles and innovations is showing, it is very hard to start building protection to cover them. Indeed, as prior research has suggested that the most important factor is the ability of protection to foster inimitability and distinctiveness (e.g., Kogut and Zander, 1992), it can be expected that the use of protection is positively related to international performance.

The features of IPRs that may enable internationalization are also relevant after the initial internationalization, as existence and use of IPRs may have an effect on the scope of internationalization both in terms of geographical expansion and the degree to which profits are gained from international markets. For example, returns on innovation are needed so as to enable further operations. Furthermore, the better and the wider the protective fence is, the more likely it is that the firm can reach many different markets as it can utilize collaborative activities in a more efficient manner (e.g., Kuivalainen et al., 2003). Even the originally less critical intangibles may reach better exploitability if they can be offered (e.g., as complementary assets) to foreign actors through licensing and other such arrangements (Hurmelinna-Laukkanen and Soininen, 2011). This can increase the profits gained from international markets. In fact, after the entry to international markets, IPRs' incentive features become relevant as well. IPRs function as an incentive factor when they open up a whole new set of opportunities. For example, they can be used to improve the image of the firm or to allow efficient knowledge exchange with different international actors—which fosters creation of new intangibles (Crossan and Inkpen, 1995). In line with this, the following hypotheses address the relationship between the use of IPRs and international performance:

Hypothesis 3a: The greater the share of products and processes covered with IPRs is, the wider the geographical scope of internationalization is.

Hypothesis 3b: The greater the share of products and processes covered with IPRs is,

the higher the degree of internationalization is.

Hypothesis 3c: The greater the share of products and processes covered with IPRs is, the better the success of international activities is.

EMPIRICAL EVIDENCE

Sample and data collection

The hypotheses were tested using the data drawn from a survey conducted in Finland in 2004. The data were collected by means of a structured questionnaire, using the key-informant technique. The initial population comprised Finnish companies from several industrial sectors engaged in R&D. All firms with at least 50 employees from nine industry sectors with different characteristics (e.g., low-tech/high-tech) were included in the sample frame. The Blue Book Database was used to identify a total of 1,140 firms, and 881 of them were reached by telephone and found to be eligible to participate. Confidentiality was emphasized and a summary of the results was promised to the respondents. Of the 881 firms, 200 refused to participate in the study. The pretested survey questionnaire with an introductory cover letter was mailed to the 681 remaining companies, followed by a reminder e-mail to those that had not responded within two weeks. Responses were received from 299 companies, representing an effective response rate of 33.9% (299/881). Non-response bias was checked on a number of variables by following the suggestions of Armstrong and Overton (1977), and did not appear to present a problem. Likewise, common method variance was checked for, and nothing problematic came up. (Calculating the correlation between self-reported profitability measure and Return on investment (ROI) information from public sources for 68 respondent companies with produced the value of 0.40 ($p < .01$); see Wiklund and Shepherd (2003) for the procedure. Most of the respondents held positions such as chief executive officer, managing director or R&D manager, indicating their seniority.

Measures

Internationalization of the firms was coded as dichotomy with a (dummy) value of 1 assigned if the company had international activities and 0 if it operated only in domestic settings. International activities were considered widely, covering activities such as sales, production, R&D carried out through different operations modes like export, licensing, collaboration, and foreign investments.

Following the example of prior research (e.g., Sullivan 1994; Autio et al., 2000), the *geographical scope of internationalization* was evaluated by the number of countries in which the company operates. Likewise, relying on prior studies, *the degree of internationalization (DOI)* was measured as the percentage of international sales from total sales. While this measure has been criticized of being quite narrow, it provides adequate information in this study.

The *success of internationalization* was evaluated in a subjective manner. The respondents specified their level of satisfaction with international activities during previous three years on a ten-point Likert scale. The evaluated aspects were (1) sales volume, (2) market share, (3) profitability, (4) market entry, (5) image development, (6) knowledge development, and (7) overall satisfaction. The average of the seven items was used as an overall indicator (Cronbach's alpha = .92).

The *use of IPRs* was assessed as the percentage of products and processes (mean) that were protected by those means. Active use of IPRs in general provides more opportunities for strategic use of the IPRs in the business environment were unexpected changes may occur regarding the relevance of the protected knowledge assets. The *availability of IPRs* (an original measure building partly on the Carnegie Mellon survey (Cohen, Nelson, and Walsh, 2000)) was measured as a mean of seven five-point Likert-scaled items describing the reasons why they would not be used (Alpha = .76). These included the costs of acquiring, maintaining and defending the rights, the difficulties in detecting infringements, the complexity of legal regulations, the length of time taken to acquire the rights, the lack of information about them, and the failure of the product to meet the requirements set for IPR protection. The items covering the perceived *strength of the IPR protection* in protecting innovation were assessed on a five-point Likert scale, partly following the Yale (Levin et al., 1987) and Carnegie Mellon (Cohen et al., 2000) Surveys. Strength of IPRs in protecting products and processes was covered with 10 items (patents, copyright, trademark, trade secrets (as appealable right), and utility models and designs) (Cronbach's alpha = .85).

Several factors were taken as control variables. Company *age* and *size* (amount of personnel) were included in the analyses, together with *R&D intensity* that was computed by dividing annual R&D expenditure by turnover. Firm size, for example, is assumed to affect international performance positively as larger firms have more resources and the possibility of achieving scale advantages in international operations. *International experience*,

measured as the number of years that the firm had operated in international markets, was also controlled for in the analysis. Finally, *industry* differences were considered.

Analysis and results

Following the example of Rodríguez and García Rodríguez (2005), the analyses were carried out at two levels with descriptive test statistics for comparative analyses on the one hand, and with regression models on the other.

Table 1 shows the results of a Mann-Whitney U test performed to examine Hypotheses 1a and 1b addressing differences in the availability and strength of IPRs between firms that are engaged in international activities and firms that operate in domestic markets. Also some other variables were included in the analyses to provide some basic information. T-test was also performed in relation to variables that are normally distributed, but as the results differ only slightly from those of the Mann-Whitney test, they are not reported here. The firms did not differ in terms of the availability of IPRs, which provides support for Hypothesis 1a. On the other hand, differences existed in strength of IPRs and use of IPRs—with higher values for internationalized firms—supporting Hypotheses 1b and 1c. Differences emerged also regarding the size and age.

**Table 1: Differences between Internationalized Firms and Companies
Operating in Domestic Markets**

Variable	Operations	N	Mean (mean rank)	Asymp. Sig.
IPR availability	international	196	3.19 (139.01)	.616
	domestic	78	3.14 (133.70)	
IPR strength	international	204	2.47 (154.83)	.003
	domestic	86	2.11 (123.37)	
IPR use	international	181	17.97 (137.69)	.001
	domestic	74	11.31 (104.30)	
R&D intensity	international	161	50.47 (111.78)	.656
	domestic	64	48.95 (116.06)	
Size	international	194	1776 (146.56)	.060
	domestic	86	1004 (126.82)	
Age	international	198	51.83 (148.56)	.006
	domestic	81	36.41 (119.07)	

On the second level of analysis, the relationship of IPR use and likelihood to internationalize was examined with binary logistic regression analyses. Control variables

were included first (for industry, electronics industry was the base condition), and then the independent variable was added. In evaluating the fit of the regression models, the Hosmer and Lemeshow test did not indicate significant difference between the observed and predicted classifications, suggesting acceptable goodness of fit (Hair, Anderson, Tatham, and Black, 2006). Table 2 shows more indicators on the models and illustrates the findings regarding control and independent variables.

Table 2: The Effects of the Use of IPRs on the Likelihood to Start International Operations

	Dependent variable	Internationalization
	Model 1	(yes/no) Model 2
Constant	1.036	1.522
<i>Control variables</i>		
Firm size ^a	1.227	.969
Firm age ^a	1.454	2.118***
Food	.073***	.067**
Forest	.387	.148
Chemical	.611	.594
Metal	.353	.448
Services	.142**	.077
ICT	.056***	.020***
R&D	2.67	1.43
Furniture	.556	2.17
<i>Main effect</i>		
IPR use		1.087
<i>Model summary tests</i>		
- 2 log likelihood	214.9	103.68
Hosmer and Lemeshow	3.796	5.570
X ²		
Cox & Snell R ²	.189	.282
Nagelkerke R ²	.270	.427
Chi-Square	45.16***	45.78***

*p < .10, **p < .05, ***p < .01

In evaluating the strength and direction of explanatory variables regarding the dependent variable, exponential coefficients were used: The value 1 indicates no effect, values under 1 indicate negative effect, and values over 1 indicate positive ones (Hair et al., 2006). In terms of control variables (Model 1), the results of the analysis suggest that industry differences exist with ICT, services, and food industry companies being less likely to internationalize. Considering the full regression model (Model 2), the results suggest

that the use of IPRs does not increase firms' internationalization likelihood. Thus, Hypothesis 2 is not supported.

Finally, international performance was assessed. IPR use and different forms of international performance were first approached by computing a correlation matrix. Only firms that had international operations (N=206) were included in the analysis. Table 3 shows the descriptive statistics and correlation coefficients. The correlations indicate that IPR use is positively related to all indicators of international performance, rendering support for the hypothesized relationship for their part. However, more sophisticated tests were needed as well.

Table 3: Descriptive Statistics and Correlations (Internationalized Firms)

	Mean (St.d.)	2	3	4	5	6	7	8
1. Int.success	5.85 (1.752)	.411**	.204**	.153 ^b	-.006	-.029	.044	.078
2. DOI ^a	53.64 (32.53)	1.00	.485**	.187*	.047	.210**	.012	.305**
3. Geog.Scope ^a	14.45 (20.17)		1.00	.201*	-.203*	.369**	.101	.251**
4. IPRuse ^a	17.97 (20.78)			1.00	-.016	-.087	-.151 ^b	-.061
5. R&D int. ^a	50.47 (180.1)				1.00	-.354**	-.114	-.203*
6. size ^a	1776 (6204)					1.00	.223**	.257**
7. age ^a	51.81 (50.81)						1.00	.454**
8. Int.Exp. ^a	50.78 (191.3)							1.00

^a Due to skewness, logarithmic transformations were used for analyses; the descriptive shows the actual values

^b p<.10, *p<.05, **p<.01

In order to uncover the nature of the relationships between the use of intellectual property rights and international performance assumed in Hypotheses 3a, 3b, and 3c, hierarchical regression analysis was applied. When necessary, logarithmic transformations were used in the model in order to correct the skewness of variables. The values of the variable inflation factor did not indicate problems with multi-collinearity (see Hair et al., 1998). There was no evidence of heteroscedasticity when examining the residuals, nor problems with autocorrelation. No violations of the assumptions of the regression analysis were consequently found. Control variables were entered first (Models 1, 3 and 5; metal industry was the base condition for industry dummies), and then explanatory variable was included (Models 2, 4, and 6). Table 4 below summarizes the findings.

Table 4: Regression Results—Effects of IPR Use on International Success, Degree of Internationalization and Geographical Scope of Internationalization

Dependent variable	Int. success		DOI		Geogr. Scope	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Food	.022	.007	-.233*	-.252**	-.173 ^a	-.192*
Forest	-.011	-.006	-.009	-.004	-.069	-.057
Chemical	.132	.111	.082	.055	.049	.022
Services	.148	.168 ^a	-.006	.021	-.122	-.096
ICT	-.188 ^a	-.213 ^a	-.202*	-.234**	-.159	-.190 ^a
R&D	-.138	-.157	-.040	-.064	.047	.023
Furniture	.003	-.015	-.102	-.125	-.039	-.062
Electronics	.094	.061	.082	.040	.050	.008
Size	-.030	.000	.252*	.289**	.329**	.365***
Age	-.063	-.044	-.169	-.146	-.030	-.007
R&D intensity	.021	.043	.176 ^a	.204*	-.083	-.056
Int.Exp.	.065	.054	.305**	.292**	.157	.145
IPR use		.193^a		.244**		.240**
R ²	.111	.145	.282	.336	.243	.295
R ² <i>adjusted</i>	.005	.032	.196	.248	.153	.203
<i>change in R2</i>		.034 ^a		.054**		.052**

Note: ^ap < .01, *p < .05, **p < 0.01, ***p < 0.001

The results show that IPR use affects all aspects of international performance, degree of internationalization and geographical scope most notably, and also perceived success of international endeavours (significant at 10 percent level). Thus, Hypotheses 3a, 3b, and 3c receive support. Some industry differences can be detected, and also international experience plays a role, in particular with regard the degree of internationalization. In the following, these findings are discussed in a more detailed manner.

DISCUSSION AND CONCLUSIONS

Internationalization of R&D and innovation activities has been accelerated with the increasing needs to efficiently respond to different demand and market conditions across national boundaries (e.g., Manolopoulos et al., 2005). Companies take their operations abroad to seek new sources of knowledge (Criscuolo et al., 2005) for innovation development and overall efficiency and profitability improvements. Nevertheless, managing intangible assets related to innovation and profiting from them is not straightforward in the international markets where complexities and competitive pressures

grow. One factor behind successful internationalization is having some control over distinctive intangible assets and their commercial utilization (e.g., Van Dijk, 2000: 175). This study contributes to existing knowledge by, first, examining a wider set of IPRs than mere patents, and second, by considering both exogenous and endogenous features of IPR protection when assessing its relationship to internationalization. Furthermore, both the IPRs effect on the likelihood of being internationalized and the international performance are considered.

Testing the hypotheses provided evidence on the relationships between protection of intangibles and internationalization. As anticipated, testing Hypotheses 1a, 1b, and 1c showed that the strength IPRs is higher for internationalized firms than for firms staying in domestic markets. Likewise, the use of IPRs is more active: in international settings IPRs are more important. There are no differences in terms of the availability of IPRs, which perhaps indicates that it indeed is not more difficult to obtain institutional protection in foreign countries.

Considering that IPRs are relatively easily accessible (even if more resources are needed) and stronger in internationalized firms, the next question then, how they are used to promote internationalization activities. Examining Hypothesis 2, it was found that the use of IPRs does not really relate to entry to new markets *per se*. This is somewhat surprising considering that also the use of IPRs reaches higher rates in internationalized firms than domestically operating ones, and as it could be expected that the wider and stronger the coverage with IPR protection is, the better the chances of the internationalizing firm are to make sure that it has some tools for situations where its legitimacy is questioned and/or infringement claims are presented. On the other hand, it may be that such concerns only relate to the most important products, services and, processes that are taken abroad, and thus the relationship may disappear. Furthermore, the results indicate that the age of the firm and certain industry differences are more decisive, leaving IPRs in a smaller role with regard internationalization tendencies.

The situation changes quite notably when the firm has established its operations in foreign markets and starts to operate there: Hypotheses 3a, 3b, and 3c were supported, indicating that the use of IPRs is relevant in all areas of international performance, whether it is financial gains and expansion, geographical scope, or overall perceived success. When a larger share of a firm's products and processes is covered, the firm can benefit from higher profit margins, and it can expand its operations more freely. While IPRs can have negative effects on the image of the firm due to patent disputes, for

example, the positive (even if moderate) effects on success in internationalization indicate that IPRs can be utilized quite widely and that they can yield different benefits depending on the strategic choices that the firm makes regarding their utilization.

Based on the above discussion and findings it can be concluded that protection of intangibles and innovations with IPRs matters in internationalization, especially considering their features that create and enhance (temporary) monopoly positions allowing strategic utilization of intangibles and IPRs protecting them. Therefore, managers should pay attention to building suitable protection and using it strategically to achieve the goals of an internationalizing, innovative firm. Utilizing a wide collection of IPRs on a broad range of products and processes may provide the needed freedom of operation and competitive edge, even if IPRs might not seem essential in the first glance when the firm enters foreign markets.

As in any study, there are several limitations in this one. Finland with a small domestic market that pushes firms to internationalize provides a good starting point, but as it has certain specific characteristics, conducting the study in other countries and regions might reveal new points of view. Also, industries with different levels of IPR protection—and other forms of protection—might be worth studying separately. Furthermore, the role of IPRs in relation to different modes of entry and different international activities might be one area of examination. The host country effects could be examined, even though in this study this issue is not as notable considering that IPRs are not taken as a mere environmental factor. One limitation is that the dependent and independent variables come from the same questionnaire. Surely, some performance measures are quite objective, but future studies could address this limitation as well. Based on the findings in this study, the IPR use measure could be refined so that it could be examined whether having critical IPRs is found decisive in the entry phase.

Nevertheless, linking protection of intellectual assets to internationalization can be considered important, and further research will undoubtedly reveal many essential dimensions of the relationship between the two. Both the findings and limitations in this study form the ground for such work.

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