

Enforcing Intellectual Property Rights through Organisational Measures: The Case of German Companies in China

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Abstract

Among practitioners and scholars it is a well known fact that the enforcement of intellectual property rights in newly industrialised countries is nearly not feasible. Neither are intellectual property rights sufficiently defined in such countries nor is the jurisdiction willing to assist foreign firms in enforcing these rights. At the same time companies from all industrialised countries establish subsidiaries in Asian NICs to evade rising costs in their home countries and to open up new markets. In order to run these subsidiaries they need to transfer technology and knowledge, which is not protected by intellectual property rights in the host country and therefore most likely subject to theft and imitation by local employees, competitors or even government officials. In the absence of a backing legal system companies must find different ways to protect their intellectual property rights.

Basing on a knowledge-based-view of the firm we explore the organisational measures taken by foreign firms in China to enforce their intellectual property rights. Our study consists of in-depth interviews with chief executives of Chinese subsidiaries of major German and Austrian companies from seven different technology-based industries (lighting, plastics, textile, pharmaceutical, specialty chemicals, automotive and medical engineering).

In our findings we identify three elements of organisational configuration, moderated by business strategy. Based on these results we discover three distinct patterns of organisational IPR protection mechanisms that can be applied to a wide variety of industries.

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1 Dimensions of knowledge transfer to foreign subsidiaries

Among practitioners and scholars it is a well known fact that the enforcement of intellectual property rights in newly industrialised countries like India and China is nearly not feasible. Neither are intellectual property rights sufficiently defined in such countries nor is the jurisdiction willing to assist foreign firms in enforcing these rights (Boisot and Child 1999, Fernandez and Weinstein 2005, Zhao 2006). At the same time companies from all industrialised countries establish subsidiaries in Asian NICs to evade rising costs in their home countries and to open up new markets. In order to run these subsidiaries they need to transfer technology and knowledge, which is not protected by intellectual property rights in the host country and therefore most likely subject to theft and imitation by local employees, competitors or even government officials. In the absence of a backing legal system companies must find different ways to protect their intellectual property rights.

In order to start production in a NIC it is necessary to transfer production technology into the foreign subsidiary. This poses a problem for multinational companies (MNC). On the one hand they need to replicate their knowledge to gain growth, and on the other hand this replication increases the risk of imitation and product piracy (Kogut and Zander, 1992).

The knowledge relevant to technology transfer can be categorized into two dimensions. First it can be distinguished into tacit and codified knowledge. While the tacit dimension of knowledge is embedded in agents (e.g. experience) and organisational structures (e.g. cross-functional teams) which make it harder to imitate codified knowledge is embedded in objects such as production manuals, workflow documentation, technical drawings, ERP and other IT-Systems, machinery, tools or even simple emails. All these are relatively easy to steal (e.g. by forwarding email attachments) and imitate.

The second dimension describes the competitive relevance of the technology. Core technologies represent the combined knowledge of a company leading to competitive advantage (e.g. knowledge of price and cost calculation algorithms, R&D plans for new production tools); peripheral technologies are older or more irrelevant knowledge

(e.g. knowledge of how to use MS Excel, out of date machinery) (Tsang, 1997; Schulz and Jobe, 2001; Cannice, Chen and Daniels, 2004).

One obvious advice to avoid unwanted technology spillovers would be: Do only transfer tacit and peripheral technology. Unfortunately this simple strategy will not work for most of the companies as there are different trade-offs in both dimensions. In the next chapter we will – on the basis of the existing literature – discuss organisational measures to protect IPRs by means of ownership, transfer of (codified and tacit) knowledge and the necessity to retain knowledge once it is transferred. In chapter three, after a short review of our sample and method, we will present our findings regarding a cross sectional comparison of the organisational elements identified in chapter two, distinguish the unique combinations of those elements for the business model of every single case and finally derive three strategic patterns, that can be observed and put to use in a wide variety of industries. The paper finishes with a few concluding remarks.

2 Organisational protection of IPRs

2.1 Control of knowledge by ways of ownership, organisational structure and IT-systems

2.1.1 Ownership structure

Foreign direct investments (FDI) into newly industrialised countries (NIC) are providing these countries with major opportunities of learning and knowledge transfer (Chen and Reger 2006). In their analysis of the interdependence of firm knowledge and firm structure Kogut and Zander (2003) find that a rising degree of tacit knowledge necessary for production increases the probability of a directly owned subsidiary, while firms producing less complex products or using easily codifiable knowledge are more likely to invest in joint ventures. This seems to be an efficient strategy for knowledge transfer as it reduces the costs of knowledge transfer in case of tacit knowledge and takes advantage of the comparative advantage of joint venture partners in NIC if the knowledge is more codified. In the latter case an equal distribution of property rights among the local and international partners guarantees easy interaction, communication and a free flow of knowledge within the joint venture (Pak and Park, 2004). Therefore in NIC with inadequate IPR protection and

enforcement joint ownership with local partners will most likely lead to technology theft and breeding of new competitors (Bai, Maher, Nickolson and Wong, 2003). In order to protect knowledge from unwanted transfer we assume that the opposite strategy of the Kogut and Zander findings should be applied by foreign investors: The easier to codify the relevant knowledge, the more property rights should remain in the investor's hand. This approach is reflected by ABB CEO Fred Kindle's answer to a journalist about his concerns of technology theft in their Chinese subsidiaries: "...we believe we can control this. Today we are holding the majority of shares in all our joint ventures" (Wirtschaftswoche, 2006, p. 11).

2.1.2 Organisational structure and IT-systems

The organisational structure should be designed to separate different fields of strategic know how like R&D, production and sales. A functional division of labour leads to a division of knowledge, but divisional and process oriented structures are built to facilitate integration of knowledge. Local management staff should only have knowledge on one functional field (e.g. production *or* sales) to avoid one single manager copying the whole business model.

Nowadays the automated flow of information through different means of information systems is intertwined with the organisational structure. The use of centralised Databases, inter- and intranet, global ERP-systems and email are vital tools to the transfer of codified knowledge and even the codification of non-codified knowledge (see Nonaka and Takeuchi, 1995, 56pp.). Especially global databases and ERP-systems are creating competitive advantage by vastly reducing the cost of information (Xu, Wang, Luo and Shi, 2006). Of course the costs of information theft are reduced by the same amount. Beside the common practice of securing IT-based information through granting different levels of access to that information it should be considered not to codify NIC relevant know how within those systems or even not to use sophisticated information management tools.

2.2 *Codified knowledge embedded in physical resources*

As Liebeskind (1996) shows, one way to protect knowledge from abuse by third parties is by simply not disclosing it. As mentioned above, the ways to render unwanted spillovers more difficult are either by keeping transferred core technology as tacit as possible or by not transferring core technology at all.

In their study of nine US semiconductor and software companies and their technology transfer policy to subsidiaries in Singapore, Malaysia and China Cannice, Chen and Daniels (2004) were able to show the application of these protective mechanisms. Fifty percent of Chinese subsidiaries were not provided with any written documentation about production processes, workflows or other technical documentation. All relevant know how was kept tacit in the heads of the responsible managers and engineers. Nevertheless this strategy is not feasible for all industries. In some cases the mere complexity of production processes may make it necessary to document workflows and to make them known to the local production personnel (e.g. manufacturing of high precision tools), in other cases like the pharmaceutical industry it is a legal requirement to keep written documentation of drug formulas and production processes and disclose them to third parties. Moreover there may be legal, technical or market reasons to establish local R&D which will lead to the production of even more documented knowledge.

In 2001 Feinberg and Majumdar investigated the Indian pharmaceutical industry concerning spillovers from MNCs to local companies. Although it is an explicit political goal to achieve knowledge spillovers by attracting FDIs to NICs and the MNCs were forced to document and disclose their formulas and production process as well as to conduct local R&D to get their drugs approved for the Indian market, the authors were unable to find significant spillovers to the local competition. Instead they found spillovers within the respective MNC from the parenting company to the subsidiary. They conclude that the MNCs transferred older and peripheral technology and that their local R&D was restricted to “last mile” research just sufficient to get their drugs approved. These findings correspond to Zhao (2006) describing the complementary division of R&D efforts between the MNC’s home country (basic research) and application of this research in NIC based R&D departments, and in a broader sense the general division of complementary knowledge between different firms.

The applicability of these strategies of not transferring relevant codified knowledge depends on complexity and market demands. The less complex products and processes the easier it is to relinquish written documentation. At the same time the use of outdated, peripheral technology will only be possible if the local market needs can be satisfied with older products.

2.3 Tacit knowledge embedded in human resources

The common way to transfer knowledge embedded in individuals is by use of human resource policies like job specific training, visiting experts and consultants and the use of expatriates for middle and upper management positions (Almeida and Grant, 1998). The more positions are staffed with homeland personnel the less likely are unwanted spillovers and the less comparative cost advantage is gained from recruiting cheaper local staff (Boisot and Child, 1999).

Expatriation – the transfer of headquarter management staff to a foreign subsidiary for a certain time (1-5 years) – is a widespread technique to control the knowledge transfer to and within a subsidiary (Minbaeva and Michailova, 2004). „*Expatriates act as a link between headquarters (HQ) and foreign subsidiaries, and a great amount of information moves through their hands*“ (Riusala and Suutari, 2004, p. 745). In his early work on expatriates Hays (1974) characterizes three tasks of the expatriate: 1. reproduce HQ-like organisational structures, 2. reproduce patterns of problem solving and 3. Tie these structures and patterns to the headquarters' structures. As it has been argued tacit knowledge is not only embedded in individuals but also in organisational structures. Therefore an expatriate is not only an expert putting his idiosyncratic knowledge to work in the subsidiary, but also an agent to ensure that the local staff work in patterns and structures more complementary to its own headquarter than to local competitors. The use of expatriates is a strategy advantageous in many ways. First, the use of expatriates guarantees the transfer of tacit knowledge without the necessity of further organisation specific training as the expatriates have accumulated their knowledge by organisational experience while working in the HQ. Second, it also guarantees the containment of competitive knowledge as the expatriates are bound by enforceable contracts in their homelands and due to wage differentials between homeland and foreign subsidiaries it is very unlikely that they will be headhunted by local competition. And third the reproduction of HQ structures by the use of expatriates creates organisational barriers that make it more difficult for the local staff to sell/commercialize this knowledge to local competitors (see also Edström and Galbraith, 1977).

Almeida and Grant (1998) describe it as nearly impossible to spill over knowledge that can only be acquired by long observation or training and/or if this knowledge requires high degrees of specialization and is only needed from time to time. MNCs

can use this special kind of highly specific/low frequency attributes of strategic and technological knowledge to prevent unwanted spillovers by using internal consultants and experts. For example major reconfigurations of assembly lines, customizing of ERP systems or optimization of sales regions (or any other major change project) could be conducted by these experts, if necessary in cooperation with the expatriate staff, but without the help of local staff. In this way strategic knowledge would remain a “black box” to the local staff and the mobile consultants would take their highly specific knowledge back to the HQ after their work is done (Kogut and Zander 1992).

The techniques for transfer of tacit knowledge discussed so far both follow the axiom to centralize competitive knowledge in very few trusted heads. Observably this simple rule can not be applied to every situation without destroying the comparative advantage of a NIC subsidiary. There is a lot of codified and tacit knowledge that has to be put in the hands and heads of local managers and staff, especially in the areas of production, marketing and sales. Following Cannice et al. (2004) the best way to do that would be by group based training and by distributing the necessary knowledge in this group in a jigsaw puzzle style. The less idiosyncratic puzzle pieces of tacit knowledge are given to one local employee and the more pieces are needed to complete the puzzle (i.e. a production process) the less likely are unwanted spillovers. A local competitor would in the best case have to recruit the whole production floor staff which is highly unlikely to be done. To a certain extent this classic approach of “divide and rule” is even applicable to codified knowledge although it is much easier to gather the whole information needed by an exchange of documents within the group. Nevertheless Cannice et al. (2004) find two thirds of their sample of high tech subsidiaries in China applying this kind of group based knowledge division.

This group based structure is likely to be found in the lower echelons of foreign subsidiaries, while the middle and upper management positions which have to be staffed with local managers for cultural, communication and cost reasons need to be supplied with competitive knowledge in order to make the right decisions and are therefore most likely to capitalize on this knowledge with local competitors (Grant, 1996; Liebeskind 1996).

2.4 Prevention of knowledge spillovers by retaining employees

The high average turnover of Chinese employees of 13% (worldwide: 6%) and the turnover rate of Chinese managers in MNCs of 30% per year is not owed to a special disloyalty of the Chinese, but due to the high demand and low supply of qualified workforce by MNCs. In this labour market situation Chinese managers are hired and trained by companies not able to pay premium wages and afterwards are recruited by firms willing to pay those wage premiums. To counteract this dynamics firms should use a dual strategy. 1. They should not invest in the general human capital of their local managers but train them highly specific skills needed for their actual job to decrease the probability of turnover. 2. Employees who have gained insight into competitive knowledge and/or have been specially trained should be offered incentives to stay with the company (Ramlall, 2004).

As it was shown by Chiu, Luk and Tang (2002) Chinese blue collar and white collar employees show a preference for current cash based compensation concerning short-term job motivation and long-term job retention. This includes base salary, performance boni, special payments in accordance with cultural events and corporate loans for houses and cars. Glass and Saggi (2002) argue that MNCs should provide well above average compensation packages to impede knowledge spillovers to local competitors through migrating workforce. The existence of such MNC wage premiums has not been investigated for China yet, but Aitken, Harrison and Lipsey (1996) were able to show these compensation effects empirically for Central America.

Nevertheless price competition in a job market with high demand and low supply is unlikely to be a good single mechanism to minimize labour turnover. Following Herzberg's (1959, 1993) proposal of a two-factor-theory of work motivation short-term monetary incentives can be described as hygiene-factors whose absence create dissatisfaction leading to disproportionate labour turnover but will not create deeper commitment to the company if present. A firm successful in retaining employees must offer benefits that can be described as motivator-factors able to create satisfaction and the wish to stay with the current company.

All of these factors are dependent on the national and regional culture and – to make things more complicated – interact with the organisational culture of the firm. To assess these cultural contingencies we will use Hofstede's (2001) framework for

assessing culture and of his five dimension we will only discuss the two most relevant to this investigation. Of more than 60 countries studied so far, China scored highest in *long-term orientation*, a factor describing the time horizon and the importance of the future relative to the present. The second relevant facet – *collectivism*, the willingness to act as a life long member of a life-long group or organisation – is very predominant in Asian cultures. Translated into organisational culture these aspects are represented by career (long-term orientation) and training and education (collectivism) as well as a management style respecting the local culture (collectivism) and the corporate reputation, which will facilitate the identification with the firm as relevant peer group. (Hofstede, 2001; Child, 1994; also Trompenaars and Hampden-Turner, 1997). We assume these non-monetary benefits to have a significant effect on labour turnover, although it must be taken into account, that those ancient Chinese cultural bounds in existing family and personal networks (“guanxi”) will very likely overrule the commitment to the employer.

3 Case Studies of German Companies in China

3.1 Sample and Data Collection

Our study consists of in-depth interviews (60-90 minutes) with chief executives of Chinese subsidiaries of major German and Austrian companies from seven different technology-based industries (lighting, plastics, textile, pharmaceutical, specialty chemicals, automotive and medical engineering). Descriptive data on interview partners and companies are summarized in table 1.

---- Insert table 1 about here ----

Our sample reflects the method of representative sampling as a wide variety of technologies and markets, minimizing possible industry sector biases. To enhance the richness of information in the sample we tried to comprise critical cases in regard to the following three criteria: a) the competitive advantage of the participating firms is based mainly on production technology or products that are codified (e.g. in patents) and enforceable intellectual property rights in their home country, b) the technology and/or product is likely to be copied, because there are local competitors with sufficient know-how and c) none of the firms has encountered major problems with technology theft or imitation. All interviews were conducted using a broad guideline

of the topics identified in chapter two and were accompanied by a questionnaire for cross-referencing the reliability of the interviewees statements. The interviews were voice-recorded and transcribed prior to the analysis. Both authors analysed the transcriptions alone and afterwards discussed their finding till they agreed on a mutual understanding of the facts.

3.2 Configurations of IPR related knowledge transfer

Prior to an in depth investigation into the unique strategies of the firms in our sample we are going to discuss some observations along the line of our literature review in chapter two and the synopsis of the interviews in table 2.

3.2.1 Company overview

First of all the *ownership structure* does not seem to have any influence on the IPR protection within our sample. Four of the companies started as joint-venture, two are still joint-ventures with Chinese financial investors with no interest in strategic or operational decisions. The remaining three firms were founded as wholly-owned subsidiaries with the explicit goal to stay in control over intellectual property. The *organizational design* and *information technology use* is very similar and – like ownership structure – does not seem to influence the IPR protection in a significant way. The *core competencies* stated by the interview partners are rather dissimilar, only two companies (F, G) totally match their core competencies, B and E match two competencies related to their production technology, while A and C are the only ones to mention market knowledge and at the same time are the only companies who state more than production technology as relevant *competitive know how in China*. While most of the companies have not experienced IPR infringement, D and E explicitly expect their products to be copied within the first three years of market entry and have embraced that fact in their business model. The existing variety in core competence bundles and relevant know-how validate the formal criteria for sample selection in representing a full range of possible approaches to the Chinese market and IPR protection.

Company overview		A	B	C	D	E	F	G
Products	Industrial lighting fixtures	Plastic profiles	Felts for textile and technical use	Pharmaceutical products	Specialty chemicals	Manual transmission parts	X-ray emitters	
Ownership structure	Joint-venture (majority of shares owned by MNC)	Wholly owned company (100% of shares owned by MNC)	Wholly owned company (100% of shares owned by MNC)	Joint-venture (majority of shares owned by MNC)	Wholly owned company (100% of shares owned by MNC)	Wholly owned company (100% of shares owned by MNC)	Wholly owned company (100% of shares owned by MNC)	
Organizational Design	functional	functional	functional	functional	functional	functional	functional	
Use of information technology	Worldwide intranet, local ERP	Local ERP	Local ERP	Customer complaints database	Worldwide ERP incl. procurement data, pricing, testing procedures, plans and results, production planning. But no information about blending procedures.	Local ERP	Worldwide ERP and intranet, e-learning platform	
Core competencies	Market knowledge, reputation, service, sales	Process management, production technology, quality	Market knowledge, process management, quality	Employee skills, reputation, quality	Process management, production technology, quality	Production technology, quality, reputation	Production technology, quality, reputation	
Competitive know-how relevant for Chinese subsidiary	Production technology, Sales and distribution, Marketing	Production technology	Production technology, Sales and distribution	Production technology	Production technology	Production technology	Production technology	
Experience with IPR infringement	Copies of single products, irrelevant to business	None	Attempted piracy of brand name	Initiated products are expected to enter the market with a three year delay	Initiated products are expected to enter the market with a three year delay	None	None	
Physical transfer of codified knowledge								
Type of technology transferred	Core technology incl. process documentation and technical drawings	Core technology incl. process documentation and technical drawings	Core technology incl. process documentation	Peripheral technology incl. process documentation	Core technology incl. process documentation	Core technology incl. process documentation	Core technology incl. process documentation	
"Black boxes" (Components of technology <i>not transferred</i>)	None (component strategy: every key technology is transferred when needed. Production technology is transparent and easy to imitate.)	Key tools for production process (every production tool is constructed as three different parts and each part is manufactured by a different company unknown to others. The tools are assembled at the production site.)	Key technology to production process (formulas for chemical treatment of felts)	None (production processes to complex to be initiated. Reverse engineering of products by chemical analysts not possible)	Key process for assembly of end-products (process instruction for blending chemical components)	Key product specifications (CAD drawings for transmission parts). Key tools for production process (every tool is manufactured in Germany and sent to China without further documentation. All worn out tools must be sent back to Germany)	None (production technology to complex to be initiated. High financial market entry barriers compared to a relatively small niche market.)	
Local R&D	none	"last mile" (only for improvement of quality control)	development of new felts	"last mile" (adjustments to local market needs)	"last mile" (testing of products for local market)	none	"last mile" (adjustment of HQ-products to local production technology)	
HR transfer of tacit knowledge								
Expatriates	all strategic positions	General manager, assistant general manager	General manager, sales manager, plant manager	Plant manager	General manager, marketing manager, sales manager	General manager (part time), plant manager (full time)	General manager (full 2007; new GM is Chinese), financial manager, supply chain manager	
HQ Experts and Consultants	Sales training for local staff, sales project managers, technical project managers	German service engineers for periodic maintenance	No use of homeland consultants	German service and chemical engineers design production processes and lab tests	Sales and technology training for Chinese supervisors and operators	Extensive use of German experts in the start-up phase 2004. Since then no use of HQ experts.	No extensive use of HQ consultants and experts	

Table 2: Summary of findings

Company	A	B	C	D	E	F	G
HR transfer of tacit knowledge (continued)							
Group-based training	Sales and technology training for Chinese staff in China	On the job training for Chinese production supervisors in Germany	On the job training for Chinese production supervisors and operators in Germany	On the job training for Chinese production supervisors and operators in Germany	Sales and technology training for Chinese supervisors and operators in China	Individual briefings on machinery operations "learning by doing"	On the job training for Chinese production supervisors and operators in Germany
Training of local management	Several weeks trainee sojourn in Germany for Chinese engineers, product and project managers	2-3 months of on the job training for plant and quality managers in German HQ	Three month on the job training for the complete Chinese management staff in German HQ	2-3 month of on the job training for production and quality managers in European production sites	On the job training for administrative (e.g. HR, finance) Chinese managers in several Asian regions, three weeks trainee sojourns for plant managers, lab managers and lab supervisors in Germany	Two weeks trainee sojourn in Germany for Chinese managers in finance and production. No abroad training for Chinese managers from other functional fields.	Several month on the job training for the complete Chinese management staff in German HQ
Knowledge retention							
Compensation package	Salary above average, group and individual boni, incentive trainee sojourn at HQ	Salary above Chinese and Japanese firms but below US firms, incentive events (e.g. five day works outing), incentive travels to HQ (initial on the job training, followed by "fresh ups")	Salary above average, incentive travels to HQ (trainings), corporate loans for employees, smaller nonmonetary incentives (e.g. dinner invitations)	Salary above average, incentive travels to Europe (trainings and cultural travels), incentive events (4 day works outing, chinese new year)	Average Salary, incentive events (works outing, chinese new year, seasonal boni), pension funds	Salary below average, occasional incentive events (1 day works outing), private health insurance, three and five year bonus	Salary above average, incentive travels to Europe (trainings and cultural travels), incentive events (works outing, chinese new year)
Training and education	Individualised training and education plans	On the job training for supervisors and managers at HQ	2-3 year vocational training as dual system of engineering college and on the job training	On the job training	On the job training	Learning by doing	On the job training for complete staff in HQ
Career	Career opportunities for Chinese staff (operator->supervisor->manager)	Career opportunities for Chinese staff (operator->supervisor->manager)	Career opportunities for Chinese staff (operator->supervisor->manager)	Career opportunities for Chinese staff (operator->supervisor->manager)	very limited career opportunities	very limited career opportunities	Career opportunities for Chinese staff (operator->supervisor->manager)
Corporate culture	High empathy for products and brands	Appreciation of chinese culture, sinocentric management style	Appreciation of Chinese culture, sinocentric management style	Appreciation of Chinese culture, sinocentric management style	Instrumental use of Chinese culture, ethnocentric management style	ethnocentric management style	Appreciation of Chinese culture, sinocentric management style
Corporate reputation	Global quality leader with two top selling global brands	Global innovation leader with strong customer focus	Reliable and stable employer	Global quality and market leader	Global quality and market leader	Quality leader in Asia	Global quality leader, division of one of the worlds biggest MNCs
Employee turnover							
Labour turnover	Very little in management and sales positions, slightly higher for production supervisors and operators	None	Very little in production, High in Sales (now use of expatriates).	None in knowledge relevant positions, Some in production operators.	Rising proportional to regional job opportunities	None in knowledge relevant positions, 10% supervisors, 30% production operators.	Very little
Reasons for high/low labour turnover (Top 3)	Reputation, compensation, training	Career, training, compensation	Compensation, career, training (for production),	Compensation, career, training.	Compensation, career	Compensation, training, career	Reputation, compensation, career

Table 2: Summary of findings (continued)

3.2.2 Physical transfer of codified knowledge

All but one company (D) have transferred their *core technology* and relevant documentation to China because they would not be able to stand international competition with outdated technology and at the same time process and technical documentation is necessary because of legal requirements and/or the complexity of the technology. D is using peripheral technology and has built its Chinese business model around it. Companies B, C, E and F use key parts of their production as “*black boxes*” to protect themselves from technology theft. The others do not attempt to shield their technologies either because it is too transparent (A) or too complex to be imitated or reverse engineered (D and G). Only C conducts substantial *local R&D*. The common use of core technology in combination with only partial attempts to protect technology was rather unexpected, but shows the competitive edge production technology gives to these firms and at the same time the trade off between efficiency and IPR protection. An easily imitable technology is not worth to be protected; a very complex technology needs no protection.

3.2.3 HR transfer of tacit knowledge

The use of *expatriates* is more extensive in the group of A, C, E and F where the most strategic positions are staffed with homeland personnel, while at B, D and G most top management positions are held by Chinese managers. B and D use *HQ-Experts* to contain relevant knowledge, A and E to disperse knowledge among the local production staff; C, F and G do not use mobile consultants. B, C, D and G send parts (supervisors) or all (supervisors and operators) of their staff to their European HQs for *group based training*, A and E train their Chinese production and sales staff in China, F gives no specific training for their staff. All companies *train their Chinese management* at their HQ. While some (A, E and F) send them there for only a few weeks for a kind of “taster course”, some others allow (B, C, D and G) several months of on the job training in Germany. The strategies pursued in tacit knowledge transfer seem largely to depend on the imitability and complexity of the production technology. E.g. A and E consider their technology to be easily imitated; therefore they try to transfer the least possible knowledge to the local staff (use of expatriates in most strategic positions, use of HQ-experts for group based trainings in China, only

short HQ visits for Chinese managers). The far opposite can be observed in case G: the complexity and costliness of the technology in use prevents imitation and demands extremely well trained staff (use of Chinese managers in all strategic positions, no mobile consultants, group based training in Germany for complete Chinese staff, three month on the job training for Chinese managers). The tacit knowledge transfer strategies of B, C, D and F can be located between these two extremes.

3.2.4 Knowledge retention and employee turnover

The efforts to decrease employee turnover and thereby to impede knowledge transfer to local competitors can be differentiated along the dimensions of short and long term effects and of monetary versus non non-monetary incentives. All interviewees agree that the compensation package is the single most powerful short term motivator for Chinese employees. Companies A, C, D and G offer the most comprehensive *compensation* including above average salary, performance boni, incentives (travel, works outing, gifts) and special benefits (e.g. language courses, corporate loans, health insurance). B, E and F also comply with culturally expected incentives (e.g. Chinese New Year celebration) but can only offer average or below average salary. The configuration of *education and training* has been discussed in the preceding section under the aspect of knowledge transfer and is the same under motivational aspects. Only C (two and three year vocational training programme) and F (no training for operating and supervisory staff at all) pursue special strategies which we expect to have impact on labour turnover. Most interviewed managers value training and career opportunities as two important long term monetary motivators. Both are considered to be investments in human capital to leverage the long term compensation profile. A, B, C, D and G offer normal *career* ladders to their Chinese staff, while E and F admit very limited opportunities for their Chinese employees.

Corporate reputation and corporate culture are fundamental long term non-monetary incentives. B, C, D and G do appreciate the Chinese culture and have applied a sinocentric management style; E and F use a more ethnocentric approach. A is not concerned about intercultural management at all and defines its corporate culture as a function of its *corporate reputation*. All companies but C and F do have a very strong reputation as a global leader in their branch.

The need to retain the knowledge transferred by decreasing the labour turnover originates from the characteristics of the relevant knowledge. The crucial areas are sales & market know how and knowledge about processes and technology. If the relevant know how is too complex to be imitated (e. g. D and G) it can hardly be copied and therefore creates little bargaining opportunities for employees with the companies' competitors. Moreover the necessity to train the employees in these solitary technologies creates human capital that can only be utilised in this specific context.

Firm specific human capital creates lock-in effects. Employees can not capitalise on their firm specific knowledge on the job market as the market value of their general human capital is below their current wages, at the same time the employer's necessary investment into education and training creates negotiating power for the employees. After receiving the specific training an employee could threaten to leave the firm, in which case the employer would lose his training investment and would again have to invest into the replacement. Therefore we expect that in firms with less imitable technology and high investments in (specific) human capital the efforts for knowledge retention should be high and turnover low. This can be observed in companies D and G.

For the same reasons complementary retention strategies can be found in firms with highly imitable technologies trying to protect their knowledge from spillovers by transferring lesser human capital to the local staff. These firms know that learning – especially in higher echelons of supervisors and managers – can not be avoided and try to retain this knowledge by offering premium (non-)monetary compensation. This strategy can be found in A and B, while E – sharing most of A's characteristics apart from the retention strategy – experiences rising turnover and knowledge spillovers to competitors. At the same time C (highly imitable/high transfer) does moderately invest in knowledge retention and F (middle imitable/ low transfer) accepts high labour turnover for cost efficiency reasons.

3.3 Firm specific strategies in IPR protection

Now, after having gained insight into recurring configurations of organisational measures protecting IPR we will now closely examine the firms IPR protection strategies in relation to their specific business model.

3.3.1 Company A: Spider in the Net

A's business is project based. As a global leader in industrial lighting whose solutions are expressively requested by star architects, the special competence of this company lies at the interface of superior but easy to imitate production technology, strong corporate reputation & brands and in its outstanding capabilities in management of complex networks of architects, lighting planners, realty developers and institutional owners. The IPRs of A are mainly protected by its experience in this kind of *network management*. Buyers are not only interested in the products but mainly in the services these products are embedded in.

This business model is reflected in the core competencies (market knowledge, reputation, service) – this is the only company not mentioning product related competencies – and relevant competitive know how in China. The physical transfer of knowledge is very open; no “black boxes” are used. The transfer of tacit knowledge to the local employees is very restricted: on the one hand no highly specific skills are needed for production or middle management on the other hand market relevant know how (key accounts, project management, etc.) is confined to expatriates in strategic positions. The efforts to retain employees are rather comprehensive but lack the intercultural orientation of most other companies in the sample; it can be assumed that the strong corporate culture is able to partly replace the national culture.

3.3.2 Company B: Divide and Rule

The main IPR protection mechanism of this company is the *division of technology know how* (core competencies) into as many different heads as possible. All technology (machinery, tools) is classified into five classes ranging from peripheral/common knowledge to key technology/top secret. All construction work for the top three classes is done in Germany and the plans are sent to the expatriate general manager who keeps them under lock and key. All machinery and tools are composed of three different parts; the manufacturing of these parts is outsourced to three different toolmakers in China (who do not know of each other or the parts purpose). Moreover everyone but the currently working operators and supervisor must keep a minimum distance of 30 meters to the production tools and machinery. Although it was necessary to transfer codified core technology to China B has managed to keep the key technology as a black box to its employees. This is reflected

in the transfer of tacit knowledge as well. Necessary maintenance – which would allow for a closer look into the black box – is done by German experts, only the Chinese supervisors have been trained in the HQ. Because of this tight sealing-off of key knowledge it is possible to use (cheaper) Chinese managers in most of the positions and in turn offer career opportunities for the local staff. Although the compensation is not totally above average the combination of career opportunities, sinocentric management and strong reputation inhibit labour turnover.

3.3.3 Company C: Faith in God

The situation of C is comparable to A: the production technology for felts is not in peril of being copied as it is common knowledge; therefore no attempt is made to protect it. There is one slight competitive advantage in chemical treatment of felts, which is protected by mixing the chemicals in Germany and not disclosing the ingredients (black box). The company is conducting genuine R&D in China. The main competitive advantage of the firm is sales and distribution know how, which is protected. Discrete customer databases are kept for different products and regions, sales staff is not allowed to enter the production site and production staff is not allowed to enter administrative buildings to prevent cross-functional spillovers

There is extensive tacit knowledge transfer to operators, supervisors and to the trusted local management that has been with the firm since the very beginning (2000) and is not expected to leave the firm. Unlike company A the market knowledge is not entangled in dense supplier-buyer networks but mostly about customers' needs and contacts. Once it is revealed to a local sales person she can easily capitalise on this knowledge in the job market. This has led to high employee turnover in the sales department in the past. Nowadays strategic positions in sales are held by expatriates to stop these spillovers. All in all the measures to retain knowledge are first-class except for the company's reputation.

3.3.4 Company D: The Tortoise and the Hare

D is the only firm in the sample using peripheral technology in the Chinese market and has indeed built its whole business model around this fact. As the Chinese market does not demand up to date products of this firm it utilises the technology gap: The first version of a product is introduced into the Chinese market when the third version is introduced into the European market. The first upgrade is introduced into the

Chinese market when imitations of the original product begin to gain market share (usually after 3 years). This product cycle protects innovative products from imitation, creates cost advantages through re-use of old European production lines in China and frustrates imitators; every time they launch an imitation into the market, the innovator launches an improved product at about the same price.

While the machinery needed to fabricate the products can be commonly bought and is quite affordable, the production processes cannot be reverse engineered from the final product and need specific skills and highly qualified pharmacists. For that reason no measures are taken to protect the codified technology from imitation, but the design of processes and lab tests are overseen by German experts. The complexity of the processes makes it essential to transfer a lot of tacit knowledge to the local staff and as a consequence large efforts are taken to retain this knowledge within the firm (e.g. language courses in UK).

3.3.5 Company E: Size matters!

As a global leader in specialty chemicals this firm relies on *economies of scale* in R&D, procurement, production, finance and marketing, realised by the extensive use of a global ERP-system. Very much like company D imitations of products are expected within three years, but are not feared. The company's customer selection (global chemical firms) makes local imitation extraneous to the business model. Most of the production is not destined to the European market. The singular ambition of this firm is to guarantee high quality products at competitive prices for their global customers

Of the codified knowledge only the blending (recipes and process) is used as a black box. The transfer of tacit knowledge is modest, the top management positions are held by expatriates; neither are high investments taken into the education of the local workforce, nor is the retention of knowledge emphasized by salary, intercultural management or career opportunities. This strategy is acknowledged through continuously rising labour turnover by the Chinese staff.

3.3.6 Company F: Code of Silence

As automotive supplier this global market leader in transmission parts relies on outstanding quality and cost efficiency of products. The quality is achieved by combination of superior production machinery (imitable) with tools for drop-forging

that are constructed and manufactured in Germany. All tools are directly sent to the plant manager (expatriate) who supervises the installation of the tool and personally sends back all worn off tools to Germany, creating a black box at the heart of the technology. Furthermore virtually no tacit knowledge is transferred to the local staff as there is no on the job training provided for operators and supervisors and only very short on the job trainings for Chinese managers.

Company F does not need to retain employees because there is no relevant knowledge transferred to the Chinese employees in the first place. With below average sales, no training, no career opportunities and a proficient lack of intercultural management competencies labour turnovers of up to 30% are gladly accepted in exchange for cost efficiency.

3.3.7 Company G: The Stronghold

The final company in this review can be said to have the best product immanent IPR protection. The production of supreme quality x-ray emitters is based on a much elaborated technology that is too complex to be imitated without own genuine experience in developing the base technologies. The production facilities needed are extremely expensive *and* specific, so there are high financial entry *and* exit barriers to enter the market. Finally, the market itself is a very narrow niche market with only a few global suppliers and buyers connected in long term personal relationships. In other words if a local competitor would gather knowledge about the technology he would not be able to reproduce it, could not afford to do so and would not find buyers.

This sustainable competitive advantage is reflected in the firm's configuration: the codified knowledge is not protected by "black-boxing", all strategic positions including the general manager are held by Chinese and all echelons of the staff are thoroughly trained in the HQ. As argued above the intensive transfer of knowledge to the local staff calls for a comprehensive knowledge retention programme for efficiency reasons rather than for means of protecting IPRs.

3.4 Identifying IPR protection strategies

From the detailed investigations of the configurational elements across all companies (section 3.2) as well as the organizational configurations and business model of each company (section 3.3) three key factors for IPR protection can be inferred: *1.The*

imitability of production technology. In the best case (G) the technology is too complex to be copied, the second best solution is an imitable, yet (partly) concealable technology (e.g. B) and the worst case would be a very transparent technology (e.g. A and C). In the later cases further protection of IPRs springs from core competencies or from controlling the flow of know how to the local personnel. 2. *The knowledge transfer to the local staff.* As said above, the best way to protect knowledge is not share it (F), although with rising complexity of production technology the more knowledge must be shared with local staff to ensure a smooth-running production. A second reason to share knowledge with the locals is cost efficiency, many firms invested in China to benefit from the cost of labour in NICs, the more local managers (instead of expensive expatriates and consultants) employed, the lower the costs(e.g. B). If a company can not avoid sharing significant knowledge with its local personnel it must take action to keep the employees as long as possible. 3. *The retention of knowledge within the firm.* The need to retain knowledge is a direct consequence of the unsatisfactory IPR situation in China and the transfer of knowledge. Again there are two reasons to minimize unwanted labour turnover. On the one hand the loss of well trained and productive personnel destroys the rents of specific human capital, on the other employees are expected to show opportunistic behaviour and to “sell” their knowledge to a competitor for higher wages.

These three factors are individually combined by the firms in our sample to fit their unique business model. In a simplified model – as visualised in figure 1 – three different strategic patterns to protect IPRs through organisational measures can be found. *Pattern 1 (A and B):* With highly imitable technology both companies try to keep knowledge transfer at bay. B does so by “black-boxing” their codified knowledge and A by minimizing the spillovers of tacit knowledge. Both are trying to retain their employees with an elaborated incentive structure. This balanced pattern merges an active protection of IPRs; technology based competitive advantages and cost efficiency. *Pattern 2 (E and F):* This strategy is similar to the first pattern concerning imitability and technology transfer but is based on exploiting low-cost workforce in China. Therefore no attempts are made to retain employees with these firms. Consequently both firms experience rising labour turnover. It can be assumed that this pattern does not provide sustainable competitive advantage, as rising labour costs in China are likely to diminish the existing cost margin. *Pattern 3 (D and G):*

This pattern represents high-tech firms whose complex production technology guards them from imitation and makes it at the same time necessary to transfer a lot of know how to the local staff. Like A and B these firms make high investments in employee retention, but primarily not because they fear knowledge spillovers to competitors, but not to loose their investments in the human capital of their highly specialised workforce. Both firms do not care very much for their IPR protection, this pattern might be as well found in countries with better IPR protection.

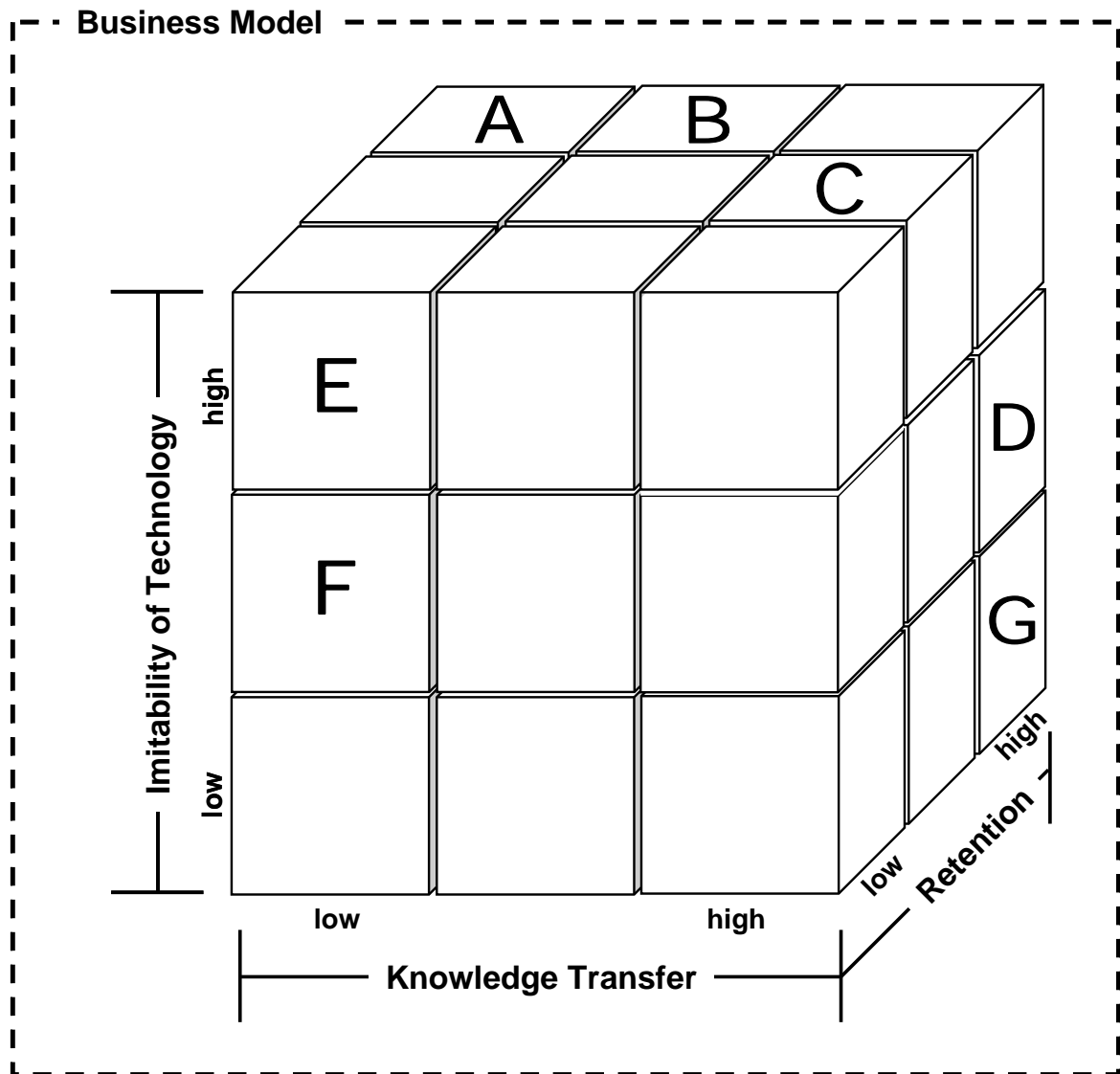


Figure 1: Strategic patterns

4 Concluding remarks

The existing strand of literature on the protection of intellectual property rights in newly industrialised countries is mainly engaged in the study of high-tech industries

(mostly semiconductors), while the literature on knowledge transfer through foreign direct investments is mainly concerned with the advancement of spillovers instead of avoiding them. This study is one of the first to include not only high-tech, but also middle- and low-tech companies to investigate IPR protection in a wide variety of industries.

As we assumed the need to protect IPRs is higher in firms with less complex and easy imitable products and technologies. We were able to show consistent organisational elements used in IPR protection as well as the need to fit the companies' business model to their core competencies and resources. Finally we were able to derive broad strategic patterns in IPR protection, closely linked to the "tech-state" (high/ middle/ low) of the respective company. However this qualitative study can only grant first and preliminary insights. In further research it will be necessary to differentiate the identified elements and apply these insights to bigger samples using self reported or microeconomic data.

Considering the value of our findings to the practitioner planning to establish a subsidiary in a country with poor intellectual property rights protection our insights can be used in two ways. Either to fit the existing homeland business model to the needs of that country or, if that is not possible, to identify possible knowledge leaks and to counteract them by the elements described.

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