

# From Doves, Magpies and Urban Sparrows: The External Strategic Forces Driving Knowledge Protection Approaches in German SMEs

David Nienaber<sup>1,2,3</sup>

<sup>1</sup> TU München, Chair of Corporate and Intellectual Property Law, Munich, Germany

David.Nienaber@tum.de

<sup>2</sup> Deloitte GmbH, Risk Advisory, Munich, Germany

dnienaber@deloitte.de

<sup>3</sup> BluePaaS Consulting, Munich, Germany

David.Nienaber@BluePaaS.de

**Abstract.** Knowledge protection serves as the means to securing valuable knowledge assets, the basis of firm strategy according to the resource-based view. Current research has not taken into account external strategic drivers. This study focuses on identifying these strategic drivers and identifies related patterns in protection approaches. I employ an explorative qualitative research design, including 9 German SMEs. The results show that firms can be categorized into 3 protection approaches. Firms set up protection like Doves, Magpies or Urban Sparrows. They are peaceful, protecting their most-valuable assets or invest in general knowledge protection, respectively. The results show that the approach depends on the external strategic drivers of an industry. Consequently, the external perspective should be included in future research. Managers can use the insights to set up knowledge protection in a focused and strategy-aligned manner.

**Keywords:** knowledge management, knowledge protection, knowledge security, industry-oriented view, resource-based view

## 1 Introduction

Knowledge is an important source of competitive advantage [1]. Its protection strives to ensure its sustainability [2]. However, what are the external drivers that make protection necessary and is protection of competitive advantage the only reason? Research on protection focuses on knowledge as a source of competitive advantage, the internal strategic perspective known as the resource- and knowledge-based view (RBV and KBV, respectively)[2, 3]. Thus, researchers focused on the mechanisms for protecting knowledge [4] and mechanism effectiveness [5, 6]. Effectiveness is influenced by firm-context and characteristics [7]. Therefore, knowledge protection is more than generalized protection [8].

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As research focused on the internal perspective, our understanding of external drivers is limited to date. Once a firm has decided to enter competition in an industry, it has to adapt itself to this environment [9]. The goal of this study is to shed light on the external strategic drivers of knowledge protection. Specifically, I aim to understand a) the protection of competitive advantage from the industry perspective and b) the influence of industry characteristics on protection strategy. Porter's five forces, the industry-oriented view (IoV), provide the theoretical lens [9, 10]. I use an explorative qualitative study analyzing the protection approaches of 9 German SMEs [11].

This paper contributes insights how external strategic drivers lead to the protection types, the Doves, Magpies and Urban Sparrows, identified in this paper. First, external strategic drivers relating to competitive advantage, (1) competitive position and (2) knowledge-based entry barriers refine the need for protection derived from the RBV. Furthermore, I discuss that the impact of knowledge loss is more significant relating to competitive positioning as opposed to entry barriers. Regarding knowledge diffusion the impact is significant for competitive positioning and entry barriers. Second, external strategic drivers beyond competitive advantage, (3) protection itself as an entry barrier, (4) entry barriers through regulation and (5) protection-related cost-shifts affect the protection type. Third, the paper shows that a firm's protection type focuses on a firm's owned knowledge but also on knowledge that other firms entrust to it. As these three aspects lead to the variation in protection types, researchers and practitioners should consider all three aspects when defining and evaluating protection approaches.

The remainder of this paper is structured as follows. Section 2 elaborates on the research gap, introduces the industry-oriented view and details knowledge protection as perceived in this paper. Section 3 describes the explorative qualitative research design. Section 4 details our findings on the types of knowledge protection and external strategic drivers. Section 5 discusses the interrelation between external drivers and protection types for owned and entrusted knowledge. Section 6 concludes the paper.

## **2 Extant Literature and Theoretical Background**

This section focuses on the connection between knowledge protection and firm strategy. Section 2.1 shows that the external perspective complements the RBV. As protection should align with strategy and research has focused on the RBV, this paper focuses on the external drivers. Section 2.2 details Porter's framework that focuses on strategy in general. Section 2.3 presents related aspects of knowledge protection.

### **2.1 External strategic drivers – Complementing the resource-based view on knowledge protection**

This section shows how the external strategic perspective helps a firm use its competitive advantage to define competitive position and adapt to its environment. Knowledge plays an important role in this strategic process [1, 3]. Therefore, investigating the external aspects of knowledge protection should complement the current focus on internals.

A protection approach should align with a firm's strategy. The internal and the external strategic perspective both shape that strategy. The external aspects provide the boundaries for a firm. Specifically, external aspects determine how competitive advantage can be used to position a firm relative to its competitors, i.e. a cost-based or a differentiation strategy [9]. As the internals and externals complement each other, both together explain firm performance better than standalone [12]. Internals refer to exploiting strengths and coping with weaknesses whereas externals refer to how a company deals with opportunities and threats [13]. Taking the internal perspective, it is the RBV that focuses on the strengths and weaknesses, specifically on how competitive advantage is derived from a firm's capabilities and strategic resources, especially knowledge [14]. Taking the external perspective, the choice of industry sets not only the threats and opportunities but also the boundaries under which a firm adapts to its environment [9]. Both perspectives are connected. A firm's strategic position in an industry is determined relative to its competitors. The basis is comparing a firm's advantages with competitors [9]. Porter's cost-based and differentiation strategies are such strategic positions. On the one hand, certain advantages lead to lower costs, e.g. due to a superior production technique. On the other hand, advantages lead to differentiating features like superior designs that competitors cannot offer. Many of the advantages are based on exclusive knowledge [1]. The decision which competitive advantages to foster illustrates how a firm can use its knowledge to derive an industry-oriented strategy, a position relative to its competitors. Depending on the chosen strategy, some advantages and related knowledge become important others obsolete.

Extant research on knowledge protection follows the notion of knowledge as a driver of competitive advantage, the internal strategic perspective. The vast majority of studies focuses on ways to protect competitive advantage by protecting the underlying knowledge. Desouza summarized the state of research in the protection of assets as the gap between knowledge management and information security [15]. Addressing the gap in his studies, the link to knowledge as a driver of competitive advantage remains the underlying assumption [16, 17]. In a recent structured literature review, Manhart and Thalmann identify 4 research streams that are all fiercely related to the RBV [4]. Though some studies cope with external aspects of the firm, for example protecting knowledge in partnerships, securing competitive advantage remains in the focus.

In order to complement the internal perspective, this paper explores the externals of protection by asking how external strategic drivers shape protection in SMEs. In detail, the paper focuses on strategic drivers related to knowledge-based competitive advantage and drivers beyond as well as their impact on a firm's protection approach.

## **2.2 The Industry-oriented View – Providing the Theoretical Lens**

This paper uses Porter's five forces framework to analyze the external strategic drivers of a firm [10]. The framework focuses on general strategic aspects of a firm, not on protection itself. As protection should align with strategy, I use the framework to identify the strategic drivers and relate them with knowledge protection in the findings and discussion section. The external drivers are determined by vertical competition, horizontal competition and the threat of substitutes [9, 10]. Along the horizontal

dimension, a company may use competitive positioning based on cost or differentiation, set up entry barriers or use signaling to fight industry participants. Along the vertical dimension, suppliers and customers may demand extended services and thereby shift the costs of performing these services. Furthermore, they may integrate forward or backward in the value chain, respectively. Entry barriers can prevent integration. I do not discuss the threat of substitutes as it did not provide any insights from the data.

**The horizontal dimension** focuses on existing competitors and potential new entrants into the industry. Existing competitors are fought by defining competitive strategies, i.e. cost-based or differentiation-based competition [10]. Both strategies are based on the competitive advantages of a firm. The specific advantages are selected and put together into a single competitive strategy. Furthermore, a firm can fend off new entrants by building entry barriers and by signaling [10]. Entry barriers are advantages of established firms in comparison to new entrants. They can take the form of competitive advantages that the entrants need before entering competition or regulations to comply with. Signaling describes messages that firms send to new entrants about their reactions [10]. A firm may say, if you enter our market we will cut prices dramatically. Thereby, the industry may become unattractive for the entrant.

**The vertical dimension** focuses on a firm's customers and their suppliers. Vertical firms may shift costs to other players or perform integration [10]. Integration means that firms on another level of the value chain enter competition with the company. Suppliers may integrate forward; customers may integrate backward. Thereby, they extend their value chain by offering similar goods and services. To fend off integration behavior, firms need to set up entry barriers. Furthermore, the shifting of costs means that suppliers or customers demand the company to execute additional activities. Therefore, the costs of performing the activities are shifted to the firm.

### 2.3 Knowledge Protection, Implementation and SMEs

The paper views protection as strategy and means to protect knowledge from loss [18], unintended diffusion [19] and to reduce its visibility [20]. In contrast to knowledge security, the study excludes knowledge being altered, becoming obsolete or unavailable [8]. Knowledge is an intangible asset. It is embedded in people's minds, tacit knowledge [3]. It can be documented to store and share it, codified knowledge [17]. Codified knowledge shows characteristics similar to information assets. Thus, information security is a part of knowledge protection with a focus on codified knowledge [15]. However, knowledge protection focuses on all knowledge assets.

Protection mechanisms are formal or informal [7, 21, 22]. Formal mechanisms are intellectual property rights, contracts and labor legislation. Informal mechanisms take the form of secrecy, lead-time and tacitness. The mechanisms are often used in combination [23]. In order to implement mechanisms, specific measures are used [4]. They are grouped into legal, organizational, and technical measures [5, 6, 24]. Legal measures refer to contracts like non-disclosure-agreements [6] and intellectual property rights [5], for example. Organizational measures refer to recruiting [17], training [17], organizational culture [3] and alike. Technical measures refer to means by which access to knowledge is protected, e.g. by firewalls, passwords or physical security [4].

The focus on SMEs prays for attention to informal mechanisms. SMEs are resource-constrained. Thus, they favor informal mechanisms as they come at lower costs [21]. Especially secrecy plays an important role compared to formal mechanisms such as patents [22]. Additionally, protection in SMEs focuses on owned and entrusted knowledge. The latter is important as SMEs operate relatively large firm networks. This helps SMEs allocating resources to core activities [21]. Such a network requires vast knowledge exchange. Thus, firm's entrust their knowledge to the SMEs and vice versa.

### **3 Method**

I employ a qualitative, explorative research design. The design is applicable, as external factors are not yet well understood [11]. The study focuses on German SMEs. Located in a knowledge society, they understand the importance to protect knowledge. Extensive variation in external factors is expected as in most other aspects of SMEs. SMEs are defined following the IfM Bonn [25], excluding blue collars from head count.

Firms were identified using theoretical sampling based on firm characteristics [26]. Seek maximum variation [27], I added firms until the results appeared mature and validated. Firms had to show high variance in characteristics that likely impact knowledge protection, size, industry, service orientation, R&D intensity, competition, network complexity and legal risk. Thereby, I ensured retrieval of rich data. Participants were chosen as they a) had personal interest, b) perceived threats to their firm or c) expect their firm to be confronted with this topic. In summary, I expect deep insights and high variation in external strategic drivers and protection types.

The study investigates the firm level using interviews and additional data as the main sources. 34 interviews were conducted with 14 managers of 9 firms. Three steps were taken to gather firm-level data via the interviews. First, all questions specifically address the firm, not the individual's opinion. Second, multiple interviewees were conducted in 5 firms. Triangulation between interviewees ensures further traceability to the firm level. Third, participants had insights in the firm's strategic dealings and protection approach due to their positions, managing director, CIO, Head of Business Development, Heads of Sales and Head of Marketing. On average 3.8 interviews per firm were conducted. The duration of interviews ranges from 0.5 up to 3 hours.

Knowledge protection approaches are highly sensitive to the firms. Recording was not allowed in 79% of the interviews. Thus, I defined a strategy to ensure data validity using semi-structured guides, active listening and triangulation. The semi-structured guides allowed for extensive note taking. Active listening served as the immediate validation step to retain the original voice by mirroring the information to the interviewee. All notes were reviewed with the participant after each section. For final validation, follow-up calls and meetings were used in situations where doubt remained.

Triangulation of interview data with firm-level data sources ensured data validity. The sources comprise 67 public and private documents. Public documents are brochures, websites, studies, financial reports, product brochures, corporate videos, general terms and conditions as well as newspaper articles. Private documents are

auditor reports, non-disclosure-agreements, code-of-conducts, internal policies and brochures on compliant behavior.

Coding and analysis focused on the external factors, identified along the vertical and horizontal dimensions [10]. I extracted the codes to a new document for focused analysis (see [28] for a details). Along each dimension, distinct themes emerged (c.f. section 4). The relative number of code segments per theme is stored in a firm-vector  $(x_i, y_i, z_i)$  with dimension  $i$ . A theme was assigned, if it scored 30% or more. Beyond pure types, mixed types with two or more themes along a dimension and themes that vary across dimensions emerged. Expert interviews served as final validation.

## **4 Findings**

This chapter presents the external drivers and protection types. The results reveal systematic variation along the horizontal and vertical dimension. The variation leads to three distinct themes for each dimension, based on the external drivers (c.f. Table 1). Drivers and themes result in the Dove, Magpie and Urban Sparrow protection type (c.f. Table 1). I begin with a summary of the themes, followed by a detailed illustration of the protection types. The external strategic drivers are discussed in section 5.

Along the horizontal dimension, firms take different approaches to fend off competitors and new entrants. Specifically, firms a) underestimate threats and perceive protection as an insignificant matter while relying on informal mechanisms on an as it happens basis; others are aware and react by b) focusing protection on their most valuable assets, their crown-jewels, or by c) implementing a broad protection that covers all knowledge, whether valuable or not. The important difference is that broad protection tries to prevent a breakdown of operations, which is a knowledge security topic, whereas the crown-jewel approach tries to stop knowledge loss and theft.

Along the vertical dimension, firms cope with threats from suppliers and customers, pursuing different approaches as well. Either, they a) misinterpret the threats, or b) protect entrusted knowledge, which is knowledge that a third party provides to the firm, and owned knowledge based on project protection requirements, or c) follow a broad protection approach. In essence, firms extend protection approaches aimed at their own assets to the assets of third parties, especially customers, and vice versa.

### **4.1 Doves**

Doves resemble the first type of protection approaches. Doves perceive the business world as peaceful. They believe in fair business practices and protection is a matter of little significance to them. Doves as the symbol of peace do not get intentionally into struggles with competitors or other third parties. When forced into a struggle, Doves solely care about their own assets. Here they rely on informal protection mechanisms or formal protection mechanisms that come at little cost, such as contracts. Small firms often behave like Doves. They do not perceive competition as intense. Their network is small. Usually, they do not do international business and do not face legal risks (c.f. Table 2). The themes along the dimensions illustrate the Dove-view on protection.

**Table 1.** The variance along strategic dimensions that drive knowledge protection

<i>Strategic Dimensions</i>	<i>Variance in Meanings</i>		
	<i>Doves</i>	<i>Magpies</i>	<i>Urban Sparrows</i>
Horizontal	<p><i>Underestimation &amp; insignificance:</i></p> <ul style="list-style-type: none"> <li>- Underestimation of threats.</li> <li>- Focus on informal mechanisms.</li> <li>- Insignificance as protection seems unnecessary or ineffective.</li> </ul>	<p><i>Focused protection:</i></p> <ul style="list-style-type: none"> <li>- Protection of crown jewels only.</li> <li>- Knowledge that is at the basis of firm success belongs to the crown jewels.</li> </ul>	<p><i>Derivation from information security:</i></p> <ul style="list-style-type: none"> <li>- Heterogeneity of knowledge leads to a general broad approach.</li> <li>- General protection of decision systems and production processes.</li> <li>- Regulatory requirements.</li> </ul>
Vertical	<p><i>Misinterpretation of threats:</i></p> <ul style="list-style-type: none"> <li>- Informal approach: Personal and reputation-based customer relations.</li> <li>- Perceived threat: Stealing of customers instead of knowledge theft by third parties.</li> </ul>	<p><i>Project protection requirements:</i></p> <ul style="list-style-type: none"> <li>- Project-based protection of customer knowledge.</li> <li>- Entry barriers by customer-specific protection and trust.</li> <li>- Protection against forward integration of suppliers by tailored approach.</li> </ul>	<p><i>General protection requirements:</i></p> <ul style="list-style-type: none"> <li>- Broad protection approach for customer knowledge.</li> <li>- Broad protection of supplier and partner portals.</li> <li>- Protection as a part of the firm's product or services.</li> </ul>
External Strategic Drivers	<p><i>Competitive advantage:</i></p> <ul style="list-style-type: none"> <li>- Threats from competitors.</li> <li>- Focus on own knowledge.</li> <li>- Ignoring vertical and entry threats.</li> </ul>	<p><i>Competitive advantage:</i></p> <ul style="list-style-type: none"> <li>- Vertical and horizontal threats.</li> <li>- Protection of crown jewels.</li> </ul> <p><i>Entry barriers:</i></p> <ul style="list-style-type: none"> <li>- Customer trust.</li> </ul> <p><i>Cost-shift – 3<sup>rd</sup> party requirements:</i></p> <ul style="list-style-type: none"> <li>- Customer-specific protection.</li> </ul>	<p><i>Competitive advantage:</i></p> <ul style="list-style-type: none"> <li>- Vertical and horizontal threats.</li> <li>- Heterogeneity of knowledge.</li> <li>- Focus on securing operations.</li> </ul> <p><i>Entry barriers:</i></p> <ul style="list-style-type: none"> <li>- Customer trust.</li> <li>- Compliance with regulation.</li> </ul> <p><i>Cost-shift – 3<sup>rd</sup> party requirements:</i></p> <ul style="list-style-type: none"> <li>- General third-party requirements.</li> </ul>

Along the horizontal dimension, Doves underestimate the threat from competitors and new entrants. They use informal protection mechanisms. They perceive protection as insignificant as they feel that protection mechanisms are ineffective. Regarding competitor and entrant threats, the case of the event equipment rental company exemplifies how Doves perceive their threat situation. In the firm's business knowledge like product rental margins and optimal product stocking is key knowledge. Discussing its protection with his managing director, the company's IT manager received the following reaction.

*What I just wanted to say, when you are discussing this with our managing director... he only says... hm, who should ever attack us?*

Doves perceive formal protection measures as unnecessary, relying on informal measures. The electrical engineering company is based on a patent for inductive transmission. After expiration, the technology proved inimitably due to its tacitness, rather by accident. Only the managing director knows it well enough so he can sell it. The engineer's job is to set up the products to a solution based on the technology and given specifications. The business development manager of the company elaborates first on the tacit protection before addressing the critical role of the managing director.

*The whole customer-specific area...[...] you just cannot copy it. [...] The transfer method, the technology that forms the origin of the company, was a patent. So, it is public now as it is older than 20 years. But ... even this is too complicated for people so that they wouldn't even want to imitate it. It is not a technology, which you simply cut open. You can't just look inside and see how it works. [...]*

*So our managing director is responsible for sales and that is just right. So, we had one that wanted to do sales and he left. You have to say, that was unproblematic. He went to another industry...because, how shall I say, the composition, the customer-specific thing is tough. So ... he (the customer) asks something and in that moment you have to run through your 100.000 options, because it is not a product, you have to give a solution. [...] And of that, no one else is capable of.*

Doves even perceive formal and informal protection mechanisms as ineffective. Therefore, the protection is of little significance. The building company provides an example. It uses secrecy in combination with motivational HR measures. It aims to prevent employees leaving. Labor legislation complements the informal mechanisms. Yet, the managing director feels that he is helpless in case key employees leave and take the most important asset, knowledge about customers with them. After elaborating on the HR perspective, he jumps quite agitated to the problem of managers leaving the firm. He even shows some degree of personal insult taken from such events.

*We try to keep our employees happy. We provide them with a car, flexibility on maternal leaves and other things to make them stay. But, this is no assurance that they stay and won't take things with them. [...] In that context, you can see a dictum that I much like to use: "The worst scam happens within your innermost circle!" So secrecy is highly important in management, but how can I ever enforce this?\**<sup>1</sup>

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<sup>1</sup> An asterisk indicates a quote, originating from an interview where recording was not allowed.

Along the vertical dimension, managers do not realize the threat from forward integrating suppliers and backward integrating customers. Their only concern is competitors trying to woo their customers. To prevent customers from leaving, Doves use open communication and build personal as well as reputation-based customer relations. To that end, Doves use informal measures such as employee retention. Thereby, they try to keep employees that have important customer relations. The business development manager illustrates the informal nature of relationship building.

*But, let me say it this way. Let's go back one step. Type MAN company xy, ok? The company was served quite well from our side. And now, firm xyz (a competitor) calls, ok? The chance that the MAN manager says ... yes the other one (the competitor) fits well, everything is fine...is really small. Yes, I mean in that regard our customer list is not uncritical when stolen, but...you see.*

## 4.2 Magpies

Magpies are the second type of firms. Magpies like all that glitters, according to folk tale. For a firm, these glittering things are their most valuable assets, crown jewels. They comprise of knowledge owned by Magpies themselves as well as knowledge, which customers entrust to the Magpies. Magpies are rather independent of size. They likely serve a specialized market by a project-driven business model. For example, Magpies implement protection specific to a project in a high legal-risk country (c.f. Table 2). The themes along the dimensions illustrate the Magpie-view on protection.

Along the horizontal dimension, magpies perceive the threat of competitors and new entrants. Magpies derive their competitive strategy from crown jewels. Thus, Magpies focus on protecting these assets. An exemplification of the importance of crown jewels is the following statement by the managing director of an equipment manufacturer. She clearly states what the firm's crown jewels are and how they use tacitness to protect its process technology.

*So, let's put it that way. You always have to be ahead. The big know-how is our process technology. Because you cannot see it. But, when you are having a look at the machines, you quickly see how it works. Another topic is automation, all control technology, the controlling, and how a plant is planned and conceptualized. This is another topic, where you can be well ahead of your competitors.*

The statement by the CIO of a manufacturer of embedded systems illustrates how the firm derives its competitive strategy from its crown jewel, service delivery. Though he refrains from stating how the related product strategy is protected, this part shows the firm's focus on this important aspect of firm strategy.

*...our focus on Added Services and the planning, which services shall be delivered in the future. This is where we are a big step ahead of our competitors. If they would know about our product strategy, they would enter the market earlier and would start competition much earlier.\**

**Table 2.** Sample characteristics

<i>Characteristics</i>	<i>Dove</i>	<i>Magpie</i>	<i>Urban Sparrow</i>	<i>Mixed Type</i>
Number of firms	3	2	2	2
No/partial/Management ownership	0/1/2	0/1/1	0/0/2	1/0/1
Listed stock	0	0	0	1
Low/medium/high size	1/2/0	1/0/1	0/1/1	0/0/2
Service/product/mixed orientation	2/1/0	1/1/0	0/2/0	0/1/1
No/occasional/continuous R&D	2/0/1	1/0/1	0/0/2	0/0/2
Low/medium/high competition	1/1/1	1/0/1	0/1/1	0/0/2
Low/medium/high network complexity	1/2/0	0/2/0	1/0/1	0/0/2
Global legal risks	0	1	2	1

Along the vertical dimension, magpies implement a project-based approach. They implement protection based on customer requirements, building trust. Furthermore, they implement protection measures on a case-by-case basis, preventing forward and backward integration. The managing director of a consulting firm illustrates customer-specific requirements and building trust as follows. He states how his customer's demand protection of specific knowledge that they will share with the firm throughout the engagement.

*The project documentation contains our methods to a certain extent. And it reflects the customer situation. Moreover, it often contains more sensitive information of the customer, well ... also information how a customer approaches specific situations. As this is highly important to his competitors, it has to be protected. Customers use NDAs to protect the project documentation and to put protection requirements on all our activities. [...] Customers give their sensitive information to us, so that we can do our work. So we need to build an environment of trust. One main aspect to build trust is an adequate protection of knowledge. [...] Customers, especially in the defense & military sector, have levels of security. Here, customers make prescriptions how to handle information of a certain security level.\**

Regarding the protection of its own knowledge, Magpies protect their crown jewels in the vertical dimension. Magpies make case-specific decisions about who is provided with which crown jewels. The managing director of the equipment manufacturer describes how the firm gives its crown jewels (see first quote in this section) to its suppliers, according to situation. The decision is project-specific.

*And, well, ... yes, you know it yourself. It is not easy to protect know-how. As said. Reengineering machines, that's what we do every day. You just can't do anything about it. You can only make sure that you are working with suppliers. With which you get along well and... yes, you give them only the information that is absolutely necessary (for project delivery).*

### 4.3 Urban Sparrows

Urban sparrows invest vast resources for protecting assets, just like the bird. Resources are readily available as the bird lives in a city. Therefore, he can focus on his territorial fights. The territorial fights stand for a broad protection approach against any threat. The firm has resources available and invests in this fight. Large firms with continuous R&D and a complex firm network are likely to employ this approach. Furthermore, global activities lead to high legal risks. Thus, Urban Sparrows cannot rely on legislation for protecting their assets. The themes along the strategic dimensions illustrate the Urban Sparrow-view on knowledge protection.

Along the horizontal dimension, Urban Sparrows implement a broad protection approach that is derived from and a benefit of information security. The reason is heterogeneity of knowledge. The approach focuses on the management decision systems and continuity of production processes, preventing firm breakdown. So, Urban Sparrows tend to derive knowledge protection largely from information security. In addition, Urban Sparrows focus on complying with regulatory standards. The managing director of a wholesaler provides an illustration of heterogeneity. He shows how he uses information security in order to maintain secrecy of codified knowledge. His quote illustrates how heterogeneity of knowledge, as the firm varies in distribution of knowledge assets, leads to the focus on security, rather than focused protection.

*Relevance of secrecy is quite limited and present in certain parts of the firm, only.*

*It varies from division to division. [...] We have a single IT company located in our Group, it is ISO 27001 certified and copes with all IT aspects.*

Protecting decision systems and production processes results in heterogeneity as well. All IT systems, all employees and all customer or supplier knowledge that belong to both or either one system, need protection. The broad protection of knowledge can be described as a benefit of information security measures as well. The following extract of an internal policy shows that secrecy is but a part of the overall approach. Secrecy, as the part relevant to knowledge protection, is only driven by regulation. Again, Sparrows derive protection of codified knowledge from information security.

*Our data and our IT systems in all technical and business divisions are protected in such a way that expected shutdown periods could be tolerated. [...] The requirements of secrecy have a normal level that is oriented towards regulatory compliance. For data of the human resource department, maximum secrecy requirements apply. [...]*

*Delayed or erroneous management decision can have widespread consequences.*

*Therefore, the access to current controlling data is highly important when management faces important decisions. For this type of information, a high level of security in terms of availability and integrity has to be guaranteed.*

Along the vertical dimension, Urban Sparrows follow a broad approach as well. Heterogeneity of customer, supplier and partner knowledge, e.g. in IT portals, drive the approach. Even so, knowledge protection can form part of the firm's offerings. A third party manufacturer exemplifies the heterogeneity of customer knowledge. He builds seals based on customer specifications and knowledge.

*As a third party manufacturer, the firm does not just have customer contact data but receives sensitive information like product specifications as well. The specifications are guiding our work. Therefore, it is self-evident that the specifications contain customer secrets.\**

The official internal policy illustrates the importance of customer requirements.

*As the customer is located in the center of all our activities, the protection of (customer) information from unauthorized access and manipulation is of existential importance for the firm.*

Knowledge protection as part of a firm's offerings is driven by customer demand as well. Here, customer demand leads again to a focus on information security. Naturally, these are used to protect codified knowledge. A managing director of a cloud provider, that is active in logistics and production as well, illustrates the logic of applying protection capabilities into other parts of one's firm.

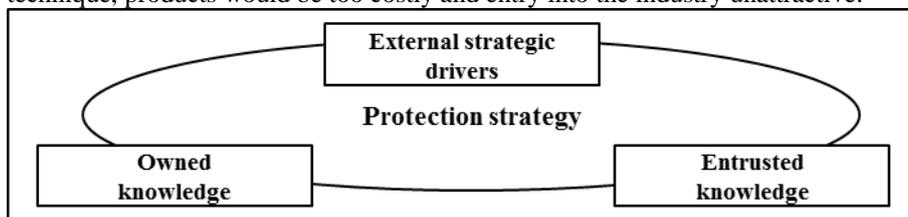
*The second topic is our data center, hmm, where in the end only authorized personnel can get in through iris-scanning-systems. These are all topics (knowledge protection), well that have been done back then, as they were customer relevant. Well, you have a point there, so that you can say to the customer, listen up, your data is safe here. Well, in the end it is part of a product. So, it is driven from outside then.*

## **5 Discussion**

The protection types show, that protection strategy depends on how a firm wants to and has to protect knowledge. It is important that firms focus on knowledge owned by and entrusted to it. The external strategic drivers affect its protection and set the boundaries. Within the boundaries, firms can decide whether the benefits of protection exceed costs and whether to focus on crown jewels or on all knowledge. Based on the external factors and these two questions, firms adopt a Dove, Magpie or Urban Sparrow protection. In addition, the protection approaches for owned and entrusted knowledge complement or extend each other. The logistics software company, for example uses an Urban Sparrow approach for their customer's knowledge. Yet, they implement additional protection specific for their crown jewels. Figure 1 illustrates and the following paragraphs discuss the external drivers related to and beyond competitive advantage as well as the protection of owned and entrusted knowledge in more detail.

The results reveal external drivers relating to competitive advantage and the RBV. Such drivers determine the protection type along the horizontal and vertical dimension. Here, knowledge needs protection as it either defines a firm's competitive position or builds entry barriers. This differentiation reveals two important insights. First, some firms do not acknowledge the threat posed from all industry participants. Doves only perceive a threat to competitive position and to entry barriers against entrants. However, they neglect the threats posed by integrating suppliers and customers. Thus, the IoV helps firms to fully assess all threats. Second, knowledge loss has a significant impact concerning competitive positioning but has a marginal impact considering entry barriers. From a diffusion perspective both have significant impact. The impact of knowledge loss related to competitive position equals a negative shift relative to

competitors. With the competitive advantage gone, competitors are likely to do more business. However, loss at one firm does not alter the barriers of the whole industry. Others will hold up the barrier. Thus, entry gets more likely but the impact on industry attractiveness is marginal. Shifting perspective to diffusion, the impact is significant on position and barriers. Competitors acquiring knowledge that builds a competitive advantage shifts competitive position. The competitor improves his own position, resulting in a negative shift of one's own position. This leads to intensified competition. Similarly, potential entrants use acquired knowledge to overcome entry barriers. For example, a production technique is important to produce at a certain price. Without the technique, products would be too costly and entry into the industry unattractive.



**Figure 1:** Industry factors and knowledge types as determinants of knowledge protection

The findings present external drivers beyond competitive advantage and the RBV, namely entry barriers relating to protection itself and regulation as well as shifts of protection costs. Such drivers determine the protection type along the vertical dimension. First, protection can build trust of customers and business partners, which serves as an entry barrier. Entrants, forward-integrating suppliers and backward integrating customers, have to implement protection. Otherwise, they cannot enter the market. As such, protection serves as a prerequisite for a business relation. Second, firms have to comply with regulations. While it is natural that firms have to comply with regulations, firms can indeed shape regulations and determine industry standards on the degree of compliance. Depending on this decision, firms can use knowledge protection to set up barriers grounded in regulation. Third, suppliers, customers and business partners may shift costs for knowledge protection on a firm due to their bargaining power. They make another firm protect the knowledge entrusted to it. The downside are higher costs, when third parties force a certain degree of protection. The need to protect third party knowledge is a shift of costs on this firm. The upside is a new entry barrier and the option to use the protection level for one's own knowledge.

Protection does not just focus on a firm's owned knowledge but on knowledge entrusted to the firm as well. The Mixed Types show that a firm can protect owned and entrusted knowledge differently. Again, protection depends on the external drivers. Owned knowledge builds strategic position and entry barriers. Entrusted knowledge needs protection to build entry barriers and derive benefits from cost shifts. Thus, protection aims at both, owned and entrusted knowledge. Both aspects interact with each other. The protection mechanisms that are set up for protecting entrusted knowledge can also protect one's own knowledge. It is management's decision in what way to comply with the requirements of industry participants and whether and how to apply these measures to a company's own knowledge.

## 6 Conclusion

This study has investigated the external strategic drivers of knowledge protection. The drivers were analyzed along the dimensions of Porter's industry-oriented view [9, 10]. The results were structured into themes of protection in the vertical and horizontal industry dimensions. Thereby, the paper identifies external strategic drivers. Thereby, I identified three types of protection, the Doves, Magpies and Urban Sparrows.

In addition, the paper contributes insights into the external strategic drivers of protection. They relate to competitive advantage on the one hand. These drivers are competitive position and knowledge-based entry barriers. On the other hand, they go beyond competitive advantage. Such drivers are protection itself as an entry barrier, entry barriers through regulation and protection-related cost-shifts. Furthermore, the paper calls for considering not only the protection of a firm's own knowledge but also of knowledge that other firms entrust to it. In summary, research and practice should consider these externals when setting up and evaluating protection.

The study has four main limitations, the focus on Germany, the focus on SMEs, the limited amount of interview transcripts and the use of interview data for analyzing organizations. The focus on Germany and SMEs limits generalizability. Firms in other countries act in different environments. Thus, they may encounter further strategic drivers that affect knowledge protection. The focus on SMEs may restrict insights as large firms have more resources available. Thus, protection approaches may not vary as intensively as for SMEs. The third topic limits the validity of our results. In 79% of the interviews, recording was forbidden. The last topic addresses the issue that interview data was used though the object of interest is the firm. The interviewee may be biased towards the firm. Thereby, he may try to shed a firm in a more positive light. Furthermore, interviewees may not report on the situation in a firm but on their general experience. However, I believe that the results are robust due to the measures taken. Future studies should overcome our limitations. Researchers should include firms of all sizes and outside of Germany. In addition, research should try to develop an objective checklist for protection types and conduct interviews with multiple persons per firm.

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