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INTERORGANIZATIONAL DATA SHARING IN HEALTH ECOSYSTEMS – A CASE STUDY

Research Paper

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Abstract

The integration of external data offers enormous potential for new and expanded value propositions for companies. Despite this potential, organizations often hesitate to share data due to the anticipated negative consequences. This study delves into the decision-making process of organizations regarding data sharing within an ecosystem and explores strategies to motivate other organizations to share data. By combining privacy calculus and ecosystems theory, we employ a qualitative case study approach to examine the German orthopedic market. Our findings reveal three risks (weakening one's position in the ecosystem, IT alignment investments, and penalties for data protection violations) and three benefits (increased value creation for the ecosystem, competitive advantage over other ecosystems, and gaining additional transactions) that organizations perceive when contemplating data sharing. Moreover, we identify three strategies for obtaining data from other organizations: mitigating the risks, emphasizing the benefits, and bypassing the calculus.

Keywords: Interorganizational Data Sharing, Ecosystems, Privacy Calculus.

1 Introduction

In today's organizational landscape, data has emerged as a crucial asset for value creation and competitive advantage. Several studies show that interorganizational data sharing (IODS) can generate relational rents (e.g., Levy et al., 2003; Loebbecke et al., 1999), defined as profits arising from exchange relationships that cannot be achieved in isolation (Dyer & Singh, 1998, p. 662). However, research also reveals a general reluctance towards IODS due to perceived risks (Clemons & Hitt, 2004; Das & Teng, 2001; Karwatzki et al., 2022; van Panhuis et al., 2014). As a result, organizations may not fully leverage their data's potential.

Within business ecosystems, decisions regarding data sharing grow increasingly complex as organizations are intertwined with a large number of other actors. This interplay transcends traditional dyadic supply chain relations, with competition shaped not only by bargaining power or the vertical allocation of value creation steps (Adner, 2017; Jacobides et al., 2018).

This complexity is particularly evident in the healthcare industry, where organizations operate within complex ecosystems comprising numerous interdependent actors. The German orthopedic market serves as a prime example highlighting the industry's characteristic intricacies. In this context, various actors, including treatment facilities (TFs), insurance companies, and manufacturers, play a part in the patient's treatment journey. They often assume different roles and positions, all working towards the shared goal of providing the best possible care while also maintaining their individual economic viability.

Given the intricate and contradictive nature of this ecosystem, it becomes crucial to understand the motivations behind data sharing decisions. Utilizing the organizational-level privacy calculus (Zhang et al., 2022) as a sensitizing device, we explore *what risks and benefits organizations perceive when deciding whether to share data within an ecosystem* (research question 1). Based on these insights, we further investigate *what organizations can do if they want to motivate other organizations within the ecosystem to share data with them* (research question 2).

To answer these explorative research questions, we conduct a case study of the German orthopedic ecosystem around one focal manufacturer of medical products (Ottobock SE & Co. KGaA - from here: Ottobock). Specifically, we interpretively analyze primary (observation, unstructured, and structured interviews) and secondary (documents, public interviews) data to understand the motivation of TFs to share patient data with Ottobock. We identify three main risks (weakening one's position in the ecosystem, IT alignment investments, and penalties for data protection violations) and three benefits (increased value creation of the ecosystem, competitive advantage over other ecosystems, and gaining additional transactions) that TFs perceive when deciding whether or not to share patient data with Ottobock. We then derive three strategies for motivating TFs to share their data (mitigating the risks, emphasizing the benefits, and bypassing the calculus). Our findings uncover the complex interrelationships between data sharing and value creation on firm and ecosystem level that may inform future research on ecosystems. Additionally, they provide recommendations for managers of organizations who try and motivate others to share data.

2 Theoretical foundation

2.1 Interorganizational data sharing

Data sharing is a core concern in seminal information privacy literature (Popovič et al., 2017). Research investigates under what circumstances individuals share data (Krasnova et al., 2010), what risks emerge from doing so (Karwatzki et al., 2022), and how design features can address those (Karwatzki et al., 2017). Most information privacy research investigates data sharing on an individual level (Bélanger & Crossler, 2011). While recently research on the group level and on sharing others' data emerged, organizational-level and IODS research is scarce (e.g., Bélanger & James, 2020; Zhang et al., 2022).

On an organizational level, research mostly focuses on transferring knowledge between organizations. Hereby, the focus is on sharing insights, mostly with supply chain partners, to optimize manufacturing processes. Findings indicate that supply chain partners benefit from successful knowledge transfer and improve their performance (e.g., Kembro et al., 2014; Li et al., 2012, 2017). This stream of literature deviates from our perspective on IODS in three ways. First, we investigate data sharing, rather than knowledge transfer. While definitions of knowledge vary, it does include tacit knowledge of processes (Galliers & Newell, 2003). Contrarily, we are interested in investigating why organizations decide to share data about their customers. Therefore, we investigate codifiable and accessible information and not necessarily aggregated and analyzed data that may be considered knowledge (Grant, 1996). Second, knowledge transfer literature typically studies dyadic relationships between manufacturing firms and supplier organizations (Kembro et al., 2014). In this study, we investigate more complex ecosystem relationships (see below). Third, knowledge transfer literature largely investigates the outcomes of knowledge transfer and the avenues that lead to successful knowledge transfer (Kembro et al., 2014). However, we take a step back and investigate the reasons and decision-making considerations when engaging in data sharing in the first place.

One dominant perspective of individual-level privacy research is the privacy calculus (Smith et al., 2011). It posits that individuals decide or intend to share their data based on an economic calculation of risks and benefits involved in sharing data (Culnan & Bies, 2003; Laufer & Wolfe, 1977). Privacy risks refer to "the extent to which an individual believes that negative outcomes may arise from others' access to his or her personal information" (Karwatzki et al., 2022, p. 1133), and benefits relate to the positive outcomes of sharing data. While the rational decision-making process has been criticized for individuals (e.g., Acquisti & Grossklags, 2005), managers of organizations are qua role expected to weigh perceived risks and benefits objectively when deciding to share data with other organizations.

Organizations and IODS are the levels of our analysis. While not explicitly referring to the privacy calculus (Kembro et al., 2014), prior research on organizational-level data sharing provides preliminary support for the organizational-level data sharing calculus. Prior research finds that organizations share data when they expect high outcomes (e.g., Ho & Ganesan, 2013; Li et al., 2017), for instance by aligning processes (Kembro et al., 2014). They also consider risks, such as opportunistic behavior from the receiving organizations (Clemons & Hitt, 2004; Das & Teng, 2001; Loebbecke et al., 1999), losing a competitive advantage (Das & Teng, 2001; Kembro et al., 2014), or costly information system investments (Kembro et al., 2014). Moreover, influencing the risks and benefits can impact organizations' willingness to share data with other organizations (Levy et al., 2003).

While preliminary risks and benefits for organizations when sharing data with others have been identified in the literature, what the risks and benefits specifically are and how they relate when making organizational-level data sharing decisions remains unknown.

2.2 Ecosystem perspective

When engaging in IODS, the goal of a focal organization is to receive data from other organizations. We study IODS from an ecosystems perspective (Adner, 2017; Jacobides et al., 2018). It builds on the observation that organizations do not operate in silos. Rather, multiple organizations have to interact with one another in order to generate value (Adner, 2017). This ecosystem perspective has important implications for IODS.

First, while multiple complementary organizations collaborate to generate value, they also have individual goals and unique perspectives on their and others' roles in the ecosystem (Adner, 2017). Thus, there is simultaneous collaboration and competition, also referred to as coopetition (Bacon et al., 2020), among organizations in the ecosystem. Regarding data sharing, the perspective of the focal organization that wants to receive data from complementors will deviate from the perspective of the organizations that may or may not share data with it. The focal organization will try and align others (incentivize them to share data with them) and secure its leading role in the ecosystem (Adner, 2017).

Second, organizations not only cooperate and compete with other organizations within the ecosystem but also with organizations that may or may not be part of other ecosystems (Adner, 2017). Other ecosystems compete with a focal ecosystem by offering similar value propositions. Therefore, how well organizations in an ecosystem are aligned will affect their competitive position with rival ecosystems. The implication for data sharing is that the higher the value the whole ecosystem can generate from shared data, the higher its competitive advantage becomes over rival ecosystems. Thus, organizations' decision to share data within the ecosystem might be influenced by considerations over the value of the ecosystem, in addition to their own competitive position in the ecosystem.

Building on an ecosystem perspective, we suggest that complementors' decision whether to share data is complex and depends on rational considerations for themselves within the ecosystem, as well as considerations of the overall ecosystem strength, as compared to rival ecosystems. Organizations that take a leading position in an ecosystem will try to align the interests and goals of the other organizations in order to receive more data.

3 Methodology

To find out how organizations decide on sharing data and what ecosystem leaders can do to receive more data, we conduct a case study which we describe next. Given the novelty and complexity of our research object, we apply a qualitative research methodology to gain insights into the incentivization of IODS. Various research paradigms can be applied to qualitative research (Bell et al., 2019; Myers, 2019). Drawing on the literature regarding IODS it becomes apparent that its antecedents are diverse and heavily influenced by the relationship between the concerned organizations (Kembro et al., 2014). We acknowledge the ideographic nature of the presented case and therefore analyze it hermeneutically from an interpretive stance (Klein & Myers, 1999). Our research methodology primarily builds on Myers (2019) complemented by the elaborations of Bell et al. (2019) and Bhattacherjee (2012).

3.1 Introduction of the case company and its ecosystem

Due to its revealing and complex nature, the current case concerns the German orthopedic ecosystem around the market-leading manufacturer of prosthetics, Ottobock. Ottobock has over 9,000 employees across more than 60 countries and operates on an annual revenue of around €1B. Founded in 1919 in Germany, it specialized in the industrialized manufacturing of prosthetics. The orthopedic ecosystem around Ottobock, as outlined in the introduction, is visualized in Figure 1. As the current inquiry focuses on understanding the motivation of the TFs around Ottobock and the derivation of suitable strategies to motivate IODS, the peripheral actors are shown for context but excluded in the data collection process.

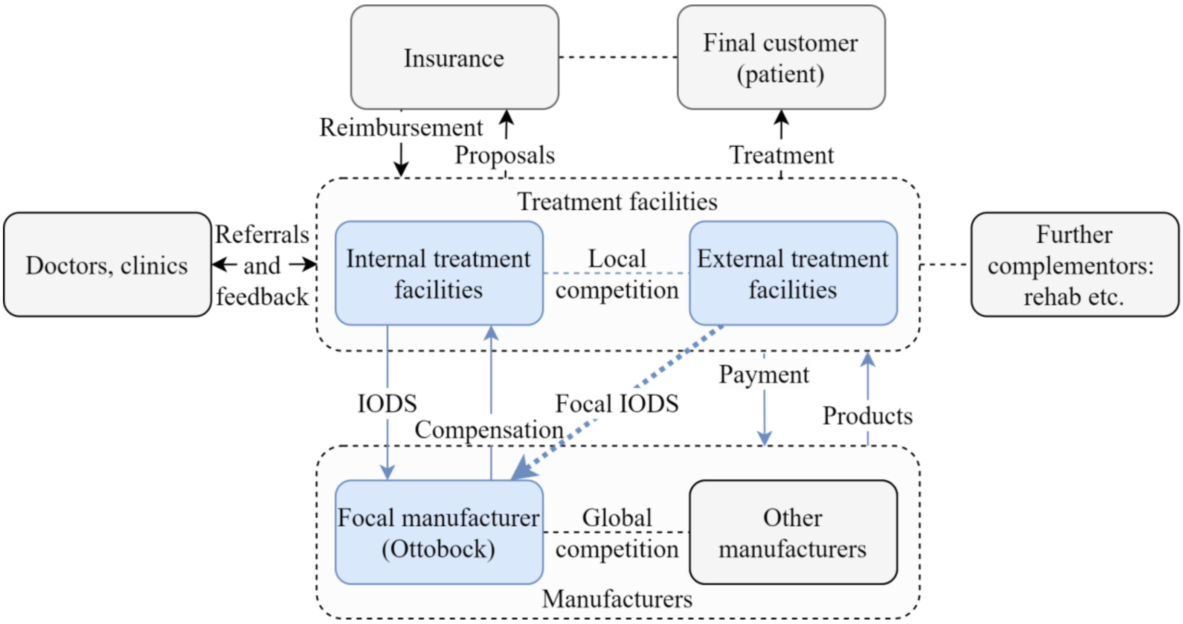

Figure 1. Analyzed German orthopedic ecosystem (blue shades indicate the focus of this study).

When patients need orthopedic treatment, they typically go to a doctor's office for an initial assessment or seek the consultation of a specialized TF directly. In the TF, the patient shares their personal data such as name, address, email address, etc. by providing their records on their health card. In the consultation, a treatment professional proposes a treatment individually to the patients' abilities and prospects of future mobility. The corresponding data collected by the TF is then stored in the patient record. As the German healthcare system is a reimbursement market, to treat a patient, the TFs first contact the patient's insurance company to ensure the financing. Here, among others, cost estimates and rationales for the proposed treatments are provided. If confirmed, in order to start the fitting of the products, they are ordered from Ottobock (or one of its competitors). In the ordering process, mainly article-specific data is shared. However, to assign the ordered articles to the current patient, TFs provide pseudonymized identifiers of the patient, too. When procured, the TFs further individualize the products and assemble them to the patient. Follow-up treatments such as mandatory maintenance of the product or the provision of updates and upgrades are generated depending on the initial treatment. Thus, keeping a lasting relationship with their patients in order to perform these treatments is important to TFs. To conduct follow-up treatments patient data collection and storage is an important means. As Ottobock aims at offering a holistic portfolio, i.e., a portfolio that offers anything a TF needs to conduct a treatment (including machinery, tools, and materials), its portfolio is diverse. However, to set the focus of this study, we concentrate on the high-revenue segments of prosthetics and orthotics. Although the vast majority of Ottobock's prosthetics and orthotics are not digitized, the product portfolio features various digitized devices as well. Besides the microprocessor-aided control of the movement of these products, the products also collect and save relevant gait data throughout their usage that can be accessed by the user through a mobile application from Ottobock and, if allowed by the user, also by the TF.

Concerning the position of the actors in this ecosystem, Ottobock historically had little direct access to the patient, as they are treated by the intermediate TFs. However, to support research and development activities or the execution of direct marketing activities, Ottobock found that direct access to the patients is needed. Therefore, the original position was extended in a way that own complementary TFs were founded as well as independent TFs were acquired. In contrast to the remaining *external* TFs (i.e., not owned by Ottobock) we call these Ottobock-owned organizations *internal* TFs.

Actor	Main activities	Position in ecosystem	Source of revenue
Ottobock	Development and production of orthopedic products.	Leads the orthopedic ecosystem as it is the biggest and most influential actor. E.g., the development of new products brings TFs to learn new treatment techniques.	Products are sold to the TFs.
External treatment facilities	Coordination of the treatment process.	Following the guidelines of the insurance companies and installation and individualization of third-party products.	Treatments of patients are reimbursed by insurance companies.
Internal treatment facilities	Coordination of the treatment process. Support in development projects of Ottobock.	Following the guidelines of the insurance companies, installation and individualization of third-party products, adherence to the instructions of Ottobock.	Treatments of patients are reimbursed by insurance companies. Internal TFs operate economically independently from Ottobock.
Insurance company	Examination of cost estimates and payment of corresponding treatments.	Sets the frame of what can be reimbursed and what not.	Fees from insured persons, subsidized by the state.
Doctors and clinics	Conducting treatments outside the orthopedic spectrum. Initial assessment and referrals to TFs.	Part of the ecosystem's periphery as doctors and clinics act mostly independently from Ottobock.	Reimbursement by the insurance companies.
Patient (final customer)	Passes through the treatment process	Reason for and end goal of all value creation in the ecosystem. Can, to some extent, decide which products to be treated with and where to get the treatment from.	-

Table 1. Characteristics of the ecosystem: actors, activities, and positions.

The external TFs are mostly small, owner-operated firms with limited capabilities to influence the ecosystem as a whole. In contrast, Ottobock can use its size and market capitalization to lead the entire ecosystem by, e.g., introducing novel standards and products. A summary of the actors in the ecosystem, their main activities, and their position in the ecosystem can be found in Table 1.

As we focus on the German market, the General Data Protection Regulation (GDPR) applies to data sharing. Therefore, we include Ottobock's data privacy officer as well as the regulatory text itself in our analysis. Here, we find that patient data, in general, is considered personal data (GDPR, Article 4.1) which requires the adherence to strict rules when collected, stored, or shared, i.e., processed (GDPR, Article 4.2). In this context, the GDPR describes patient data that contains health data as especially sensitive and hence especially worthy of protection (GDPR, Article 9). While the processing of patient data is prohibited in general (GDPR, Article 6.1 and 9.1), several conditions under which it is possible are presented (GDPR, Article 6.2 and 9.2). Data privacy regulations set the regulatory boundaries of how patient data can be processed and hence shared. Analyzing our case, we find that the most important condition here is the "explicit consent to the processing of those personal data for one or more specified purposes" (GDPR, Article 9.2a) of the data subject, i.e., the patient. We characterize the patient data that accumulates as a patient is treated for orthopedic reasons below (see Table 2).

Data Category	Data	Collector	Accessibility
Master Data	Contact data (name, address), age, etc.	Insurance Company	TF
Master Data	Weight and further measurements	TF	TF
Treatment data	Diagnoses	Insurance company, TF, other complementors	TF
Treatment data	Installed products, configuration, modeling files, images, and videos	TF	TF
Usage data	Movement patterns	Ottobock	Ottobock

Table 2. Patient-related data in the ecosystem.

3.2 Data collection

As we conduct an interpretive case study that applies principles of hermeneutics (Klein & Myers, 1999), the triangulation of multiple subjects that represent various voices and hence viewpoints are needed (Myers & Newman, 2007). Therefore, on an organizational level, we collect data from both sides of the data sharing process: Ottobock and internal, as well as external TFs (see Table 4).

Utilizing our early and extensive access to Ottobock as a result of a working student employment of one of this study's authors throughout the data collection process, we were able to collect high-level organigrams and utilized the internal systems such as the intranet and the open directory to get insights into the firm's structure, strategic objectives, current projects, and potential interviewees. Building on this, we figure that the application of a snowball sampling technique complements our direct sampling to gain valuable contacts that reflect a comprehensive view of the case (Bell et al., 2019). Since interviewees are recommended to be purposely selected based on their expected informational contribution to the case (Myers, 2019), we conduct 12 initial, non-structured interviews to gain insights into the internal responsibilities of the staff as well as possibilities to bound the case further. Thereby, we aim at maximizing the effectiveness of the interviews regarding the theoretical contribution while also mitigating the "elite bias" (Myers & Newman, 2007, p. 5) that could occur when only focusing on high-level management staff. Due to the unstructured and open character of these initial interviews, only two of them are recorded and transcribed. Thus, the interviewer collects valuable notes and documents. An overview of the collected data and its purpose for this study is provided in Table 3.

Type of data collected	Purpose for this study
17 weeks of observation/working in the field	Getting access, entering the field, pre-understanding
12 unstructured interviews with Ottobock employees in various positions (e.g., Head of Business Solutions, Data Analytics Expert)	Familiarization with the case company, formation of pre-understanding
1 secondary interview (podcast) with Ottobock's Chief Strategy & Transformation Officer	Familiarization with the case company, formation of pre-understanding
19 documents (e.g., product sheets or treatment overviews)	Familiarization with the case company, formation of pre-understanding
10 semi-structured interviews with Ottobock, internal, and external TFs	Understanding IODS incentives

Table 3. Collected data and corresponding purpose.

Building on the insights of this initial phase, we prepare and conduct semi-structured interviews with Ottobock employees on multiple levels as well as managers of multiple TFs. These interviews are prepared based on the insights of preceding interviews and our evolving understanding of the case using individual interview protocols. Each of these ten semi-structured, as well as two of the unstructured interviews, are then recorded, transcribed, and analyzed (see Table 4).

Regarding the TFs, we use a combination of snowball and direct sampling to select relevant interviewees for this study. That is, the first interviewees from external TFs are referred to by the Head of Prosthetics Sales at Ottobock. Here, the rationale is that these contacts are both relevant and willing to disclose knowledge in the context of our empirical study. Due to the perceptions of these interviewees that the study itself originates from Ottobock and hence the risk of biased data disclosure, we complement this data collection technique in the subsequent phase with data from interviewees that are contacted directly by the interviewer via email and telephone. We use Ottobock's publicly available directory of related TFs (Ottobock SE & Co. KGaA, 2022) to ensure that the selected TFs procure products from Ottobock (and hence are part of the examined case).

Since, among others, hermeneutic analysis builds on the principle of contextualization (Klein & Myers, 1999), the interview questions are designed so that the context of the interview becomes apparent. For instance, interviewees at external TFs are asked about their data capabilities, who is responsible for digitalization and IODS, or how they characterize their relationship with Ottobock. Additionally, unstructured and not recorded background discussions with specialized staff such as the global data privacy officer or the head of German sales at Ottobock are held to provide context.

Interviewee	Organization	Position of interviewee within the organization
P1	Ottobock	Marketing Manager
P2	Ottobock	Head of Digital Product Unit
P3	Ottobock	Data Analytics Expert
P4	Ottobock	C-Level Manager (concerned with digital innovations)
P5	Ottobock	Global Head of Business Unit
P6	Internal Treatment Facility	Operations Manager / Director Patientcare
P7	Internal Treatment Facility	Team Leader
P8	External Treatment Facility A	Managing Director
P9	External Treatment Facility B	Managing Director
P10	External Treatment Facility C	Managing Director
P11	External Treatment Facility D	Managing Director
P12	External Treatment Facility E	Member of the executive board

Table 4. Transcribed interviews of the case study.

3.3 Data analysis

The collected qualitative data is analyzed in an interpretive way (Klein & Myers, 1999; Myers, 2019) and supported by grounded theory techniques following the Straussian tradition (Corbin & Strauss, 2015). While the former guides our analysis on a more fundamental level, the latter is used as a practical approach to work with qualitative data effectively. Following the open coding approach, we analyze each interview transcript. Based on the open codes, we then perform axial coding, i.e., structure, select, and reassemble the open codes to generate insights. As we apply interpretive principles based on hermeneutics, we conduct this axial coding for each interview individually (parts) and then with respect to the whole, i.e., the previously analyzed interviews and the theoretical lens. Thereby, we are able to identify both, similarities of the different perspectives and, in the context of hermeneutic reasoning, more interesting, conflicting elaborations that require further discussion. These preliminary findings were then used to prepare for the next interviews.

After data collection and the initial analyses, conflicting perspectives are analyzed using theory. Theory in interpretive research is described as a “sensitizing device to view the world in a certain way” (Klein & Myers, 1999, p. 75). Consequently, we utilize the ecosystems and privacy calculus perspectives as a basis to structure the codes to follow the principle of abstraction and generalization.

Since the first author possesses deep insights into the case company due to his previous affiliation with the case company, we carefully pay attention to potential bias in the data analysis (see the principle of interaction between the researcher and the subjects; Klein & Myers, 1999). Discussions of the codes, analyses, and findings with additional authors addressed these biases and impacted the results. Further elaborations on how we addressed the principles of interpretive research (Klein & Myers, 1999) can be found in the Appendix. In the findings, we use interviewee quotes, translated into English, to illustrate the concepts we identified.

4 Findings

As we argued in the introduction, manufacturing firms in an ecosystem perceive opportunities in the analysis of the data related to the users of their products, i.e., patient data, and we find that this notion is also eminent in the case of Ottobock (e.g., P5; P4; P6). However, when analyzing the willingness to share patient data by the TFs, we find that these organizations state a general reluctance towards sharing patient data. To gain a deeper understanding of the **TFs' underlying rationales**, we represent their decision as a calculus consisting of data sharing risks and perceived benefits (see Table 5).

Risks	Benefits
• Weakening one's position in the ecosystem o Lose links to patients o Lose value creation activities • IT alignment investments • Penalties for data protection violations	• Increased value creation of the ecosystem o Superior products o Provide better services • Competitive advantage over other ecosystems • Gaining additional transactions

Table 5. Risks and benefits of sharing patient data within the ecosystem.

4.1 Risks of IODS

We argue in the following that **weakening one's position in the ecosystem** is considered a main risk of IODS. This intra-ecosystem competition between the data sharing and receiving organization is characterized by two main IODS risks for the sharing organization. First, interviewees express the risk that they might **lose links to patients to Ottobock** as they could contact the patients directly with the goal to take over the treatment (see also, e.g., P9; P11):

I do not know what happens in such conversations [of Ottobock and my patients] because Ottobock has its own workshop. And we as a firm, of course, fear that Ottobock takes it all. And by that, I mean not only the marketing of its products but that it tries to treat more patients in the long run. (P12)

Considering the prior-discussed importance of each patient for the TF with regard to its profitability, sharing patient data is expected to result in economic drawbacks that can bear existential threats as a long-term consequence. From a TF's perspective, the described risk represents the loss of a link to an actor that would potentially lead to profitable activities.

If the patient data is sent directly to Ottobock – and not to us, as it's currently done – then we would be excluded from this process. In this case, we would lose the treatment. And that would be damaging for our business, if not threaten our existence. (P12)

Consistent with our elaborations on the need for a TF to be profitable, this utilization of the patient data leads to the TFs arguing that patient data is their main asset and source of constant revenue streams:

The patient data is of great importance to me because we generate follow-up treatments from it. And it would not be nice if somebody else would. (P9)

The second risk of IODS perceived by the TF concerns the risk to **lose value-creation activities** to the receiving organization. Specifically, the potential of Ottobock learning from the shared data in a way that substitutes the TFs is feared. For example, in the context of sharing 3D modeling files, interviewees express the fear that Ottobock might analyze the 3D models such that they either derive orthopedic know-how from it or collect large amounts of examples that could be used for automating their own treatments.

If you have special know-how in modeling files, these files should stay in our firm. […] I do not like to just share these files for milling jobs with companies like Ottobock. (P12)

The manufacturer can use this [measurement] data to, for example, set up a library that enables the manufacturer to turn the currently individualized treatment into serial production. (P10)

Considering the quotes above, this fear is explicitly stated referring to "companies like Ottobock" (P12). Interpreting this particular wording with respect to the elaborations of other interviewees, we argue that the interviewee here refers to, first, the size of Ottobock and its ability to utilize economies of scale ("serial production", P10). Due to its size, Ottobock is expected to operate more efficiently by utilizing economies of scale. The resulting cost advantage for Ottobock would then lead to competitive disadvantages for the external TFs as a consequence:

The question is: why does Ottobock have an immensely large workshop in Duderstadt that is more productive and efficient than mine? And why does Ottobock need me? (P9)

The interviewees refer to Ottobock's advances to integrate forward discussed above. Although it is not expected that these advances can be stopped, interviewees argue that providing Ottobock with more actionable knowledge, i.e., the knowledge that can be used in treatment processes, can accelerate the forward integration and hence strengthen the intra-ecosystem competitiveness of Ottobock (P8). Contextualizing this argumentation with the need to maintain a strong position in the ecosystem discussed above, negative consequences regarding the competitive position and the TF's profitability are expected. Faced with this struggle, TFs use the withholding of patient measurement data as a measure to decelerate the expected market centralization and prevent their loss of relevance.

One has to see it like this: Ottobock is like Goliath and I am David. And I want to keep a slingshot in my hand. What I want to say is simple: I do like collaborating with Ottobock and I think this can be mutually beneficial. But we have to be transparent and open to one another with regard to how long this can be actually beneficial. (P8)

In addition to the described application of patient data as a means to contact patients, the potential for further, advanced utilization is recognized (e.g., P7; P11; P12). For instance, two interviewees independently recite the saying that data is the new oil (P8; P9). At the same time, interviewees acknowledge that their capabilities do not suffice to materialize the value of the data. Juxtaposing the expected potential in analyzing patient data, on the one hand, and the TF's inability to do this alone, on the other hand, one could infer that interviewees are inclined to share data to promote the ecosystem's overall value creation. However, we find that TFs try to refrain from IODS:

As you probably notice, I find it difficult to give out patient data. Because I think it is an underestimated knowledge of a company. It is a valuable good. (P10)

Therefore, an alternative interpretation of the quote is that TFs do not want to share patient data *because* they expect that the organization the data is shared with might generate value from it. This interpretation is consistent with the elaborations of some interviewees arguing that the orthopedic market is extremely competitive (e.g., P9; P11) as well as with the prior inferences regarding the intra-ecosystem competition. Sharing patient data would therefore lead to Ottobock being able to utilize it on its own. In the cited elaborations about the industry's characteristics, the aversion towards IODS is described as not grounded in negative consequences for the sharing organization but in the perception of another company's benefit, hence, the relative weakening of one's position.

While the prior risks originate in the ecosystem, our analysis identifies risks beyond the ecosystem. First, **IT alignment** between Ottobock's and the TFs is perceived as troublesome. There is no centralized database that could be used as a source. On the contrary, data is found to be stored among various systems, sometimes even analog, increasing the required effort to prepare IODS. Consequently, in order to get the patient data from the TFs to Ottobock, interfaces need to be provided. The heterogeneity of systems again demands diverse interfaces to enable efficient IODS.

Because I would have the effort. I had to collect the data from the beginning, transfer them, only so that a supplier can use the data for its means. (P10)

Besides the additional efforts that come along with IODS, we also find that **penalties for data protection violations** are perceived as a risk of engaging in IODS. Since the GDPR defines the patient as the owner of the patient data, the TF must get their permission in order to be able to share this data. The collected data suggests that these regulations play an important role in the expected outcome of data sharing. Based on prior experiences, some managing directors fear that, as a data privacy regulation violation might be an outcome of IODS, they are faced with financial expenses:

We once had a major data privacy incident, when the post office lost our accounting information. Data privacy puts us really under pressure and we want to avoid any incident. (P10)

4.2 Benefits of IODS

In contrast to the prior argumentation that describes the risks of IODS, interviewees also describe the possibility of benefitting from IODS with Ottobock. We find that the perceived benefits from sharing patient data within the ecosystem are more complex and in parts indirect. Broadly speaking, they can be grouped as either having a positive influence on the *individual* TF or on the ecosystem as a *whole*.

Starting with the latter, the following quote from P11 illustrates the leading role of Ottobock in the ecosystem as an important innovator in the ecosystem.

If [patient data] is solely used for research and development then everybody benefits from it. Because, one could say, Ottobock researches for the whole industry. And that helps everybody. (P11)

Consequently, this statement illustrates the expectation that an individual TF benefits from the research advances of Ottobock as it leads the entire ecosystem towards **increased treatment quality**. This view is consistent with the elaborations of various interviewees at Ottobock describing the rationales of Ottobock's advances to collect patient data as a means to become patient-centric and develop **superior products** (P3; P4; P5). From an ecosystem's perspective, interviewees acknowledge the fact that IODS does have positive effects on overall value creation.

Further, the collected data suggests that the opportunity to compare one's performance within the ecosystem is considered an opportunity to **provide better services**. That is, being able to generate insights not only from the individual TF's patient data but by incorporating data from sources outside the TF. In the interviews, the incorporation of patient data from both, other TFs in the ecosystem as well as digitized products is described. For instance, by analyzing and aggregating the data from other TFs in the ecosystem, Ottobock can provide the focal TF with market insights to facilitate learning, e.g., recommend specific configurations of services. This data can then be used to evaluate the individual TF's business performance (P3) or the quality of the treatment:

One could ask: why do we conduct our treatments differently than other facilities in Wuppertal or Bavaria? And so on… If we can draw conclusions from this and can participate in these conclusions, then this [IODS] would be different. (P9)

However, it is important that these insights can be used to "draw conclusions" (P9) in order to be considered valuable. In the current example, the learning opportunity must enable the TF to make decisions that lead to positive consequences in the long run.

In addition to the benefit captured from the ecosystem's value creation, the analyzed data also suggests that being part of such an ecosystem is perceived as a **competitive advantage over other ecosystems**. In this context, P9 stresses the importance of the ecosystem as a major driver for competitive advantage:

Because I think a relatively large number of treatment facilities can provide prostheses. But the question is, how can you set yourself apart? (P9)

How could you provide high-quality treatments to the patient? And do that better than others... (P8)

Thus, interviewees perceive the possibility of capturing the value of innovative products in the market. Being able to install a certain product is expected to lead to increased treatment quality and an improved competitive position of the ecosystem as a whole. Competition between TFs happens mostly on a local level since patients tend to choose facilities that are close to their homes (P5; P7). So, when a TF is one of few facilities in the area able to provide certain products or services, this can be a competitive advantage:

If you go to our website and select the Genium [a digitized knee joint prosthesis], you can see: where do I get this product within a radius of 50km from my home? And being listed on this website is indeed a lucrative marketing measure. (P7)

This quote about Ottobock supporting TFs in their marketing also illustrates another benefit of sharing the patient's contact data. That is, the potential of **gaining additional transactions** for the TF and consequently increasing the TF's profitability. Above, we inferred that Ottobock contacting the patients directly is expected to result in lost links to final customers and hence a weakened position in the ecosystem for the TF. At the same time, however, the prospect of Ottobock contacting the patient directly also suggests the contrary: Through direct advertisement advances of Ottobock, patients became aware of novel and complementary products that they then purchased at their original TF.

[The patient] of course is informed about innovations [by Ottobock]. And, depending on what kind of person he is, he wants to try it out. For example, once a patient ordered a remote control from us although we did not inform him about it. He got this information from Ottobock. (P12)

Consistent with this elaboration, the goal of increasing the demand for products through patient-individual marketing advances is also described by interviewees from Ottobock (P6).

Consequently, we find three main benefits of IODS perceived by the TF. As a part of the orthopedic ecosystem around Ottobock, they are able to provide better treatment and strengthen their competitive advantage towards other ecosystems. Also, by enabling Ottobock to contact their patients directly, TFs see the potential that new transactions arise from these interactions.

4.3 Strategies to obtain patient data

Building on the prior elaborations, we now switch perspectives and describe strategies for Ottobock to motivate IODS. The first strategy refers to **mitigating the risks** that come along with it. Here, interviewees of Ottobock (e.g., P4 and P5) describe their advances in supporting the TFs with matters of data regulation and IT alignment.

S*ince [treatment facilities] have only little [IT] competencies in-house, they wait for a bigger company like Ottobock to say: look, this is our solution. It is ready to use, plug, and play.* (P4)

However, as the perception of risks such as the weakening of the position in the ecosystem to expected opportunistic use of contact data against the sharing organization are inherent to IODS, mitigating the risks alone might not move the calculus in favor of sharing patient data.

Hence, **emphasizing the benefits** of IODS is considered the second strategy to obtain patient data from complementors. In the analyzed case, Ottobock is engaged in developing solutions that explicitly aim at coupling the benefits for the receiving and sending organization. Specifically, advanced insights into the TF's data enriched by complementary data from products and other complementary organizations are intended to elicit IODS:

The generated insights are the incentive. The basic idea is to say: you get something in return [for the shared data]. […] These are insights [the treatment facilities] cannot generate themselves. (P3)

The third mechanism for the ecosystem's leader to obtain patient data is simply **bypassing the calculus**, i.e., exploiting opportunities to get patient data that do not depend on the active decision-making of a TF. For example, in the presented case, Ottobock uses its financial power to acquire and integrate TFs.

Even if not holistically, this measure provided Ottobock with valuable patient data that is used for research and development projects. Also, we find that Ottobock complements its products with digital applications that can collect patient data and enable direct access to the final customer (P2). Lastly, it is found that to order products of a certain complexity it is obligatory to share patient data with Ottobock. Here, the necessity to engage with the manufacturer more closely elicits IODS.

The more complex a treatment gets, the more engagement of the supplier is needed. And this collaboration requires the exchange of patient data. Yet, we try to minimize this exchange. […] However, sometimes we are contractually obligated to share this data. (P9)

5 Discussion

We started the inquiry motivated by the puzzle that, although data sharing is found to be beneficial for ecosystems as a whole, organizations still perceive major risks in engaging in IODS (Kembro et al., 2014; van Panhuis et al., 2014). We investigate the resulting general reluctance by using the privacy calculus (Smith et al., 2011) to understand the motivation of the ecosystem's followers (Adner, 2017; Jacobides et al., 2018) to engage in IODS. Our finding that, consistent with an organizational-level data sharing calculus, the decision of whether to share data with others is a result of balancing risks and benefits provides insights into research question 1. Aiming at overcoming the reluctance to share data, we address research question 2 by highlighting three strategies for organizations to obtain data from other organizations.

Discussing the insights into both research questions with the literature, we can derive various theoretical insights. Extending the existing literature emphasizing the risks of IODS (Clemons & Hitt, 2004; Kembro et al., 2014; Loebbecke et al., 1999), we also infer various benefits for the sharing organization from sharing data with complementors in an ecosystem. Although the expectancy of high outcomes is described as an antecedent of IODS in the prior literature (e.g., Ho & Ganesan, 2013; Li et al., 2017), we complement these findings with in-depth insights into what these benefits are. Applying the privacy calculus theory, our results indicate that the decision to share patient data with complementors is based on rational decision-making processes. While organizations in this decision-making process consider risks and benefits for them individually, our findings emphasize that both, risks and benefits, are strongly shaped by the ecosystem's dynamic. That is, while the risks of opportunistic behavior of complementors (Clemons & Hitt, 2004; Das & Teng, 2001; Loebbecke et al., 1999) can be understood as the risk of weakening one's position in the ecosystem (Adner, 2017; Jacobides et al., 2018), benefits for the entire ecosystem (e.g., in competition with other ecosystems) provide rationales to engage in IODS.

Building on the balancing risks and benefits within the ecosystem, our findings implicate that organizations that want to acquire data from others can influence this calculus. Although this relates to antecedents like trust and control in prior literature (Das & Teng, 2001), our study uncovers the underlying risks and benefits and suggests specific strategies to balance this calculus in favor of IODS.

For practitioners, this study provides unique insights into the rationales of organizations to refrain from or engage in IODS. Practitioners can use these insights to increase their chances of obtaining data in three different ways: In general, they can mitigate the perceived risks or emphasize the benefits of IODS. Our findings also point to a third, less obvious, strategy of bypassing the calculus by, e.g., acquiring the complementors, digitizing their products, or making data sharing conditional for ordering products.

6 Conclusion and further research

Addressing two research questions concerning the motivation of organizations to share data in ecosystems (research question 1) and possible strategies to motivate this data sharing (research question 2), we conducted an in-depth case study in the German orthopedic market around a focal organization. We apply the privacy calculus as a sensitizing device to infer three risks (weakening one's position in the ecosystem, IT alignment investments, and penalties for data protection violations) and three benefits (increased value creation of the ecosystem, competitive advantage over other ecosystems, and gaining additional transactions), from the analyzed case. Building on these findings, we find three strategies for organizations to obtain data from other organizations (increased value creation of the ecosystem, competitive advantage over other ecosystems, and gaining additional transactions).

There are limitations to our study that call for further research. First, although we provide transparent descriptions of our methodology for the empirical inquiry, the interpretative analysis of a single-case case study bears the risk of overgeneralizing the findings. Consequently, we generalize from our case study by discussing it with existing literature. Due to the complexity of the case as well as the focus on a specific organization from a specific industry in a specific market, we suggest further research to select different foci. Hence, future research might include other ecosystem actors, such as patients, insurance companies, or doctors, and take multi-level theory-building approaches to adhere to this complexity.

The current study provides insights into benefits for the ecosystem that are opposed to risks for the individual firm to weaken its position in it. Since we find this aversion towards IODS even when an organization engages in IODS, further inquiries about the nature and longevity of mechanisms that elicit IODS from the receiving organization seem promising. Further, in a lot of cases, organizations seem to refrain from sharing data as a result of balancing the risks and benefits of IODS. Therefore, further quantitative research could engage in testing the statistical significance of both, risks and benefits, complemented by inquiries about the probability of their occurrence on the actual sharing behavior.

The analyzed case contains rich insights into what kinds of patient data are collected, stored, and shared within the ecosystem. However, our analysis does not yield knowledge about how the different kinds of data (e.g., contact data, diagnoses, or measurements) influence an organization's willingness to share it. Hence, future research can investigate the relationship between the type of data and the specific risks, benefits, and willingness to share each type of data.

We find that the weakening of the position in an ecosystem is considered a risk of IODS. Hence, further research might investigate how the data sharing organization can engage in IODS without weakening its position, i.e., by ensuring participation not only in the ecosystem's value creation but also in its appropriation.

Appendix

We describe one example that showcases our inductive and interpretive approach to data analysis. P8 stated that their TF does not share any data with Ottobock. Approaching the interview and subsequent analysis **suspiciously**, we **contextualized** this statement with other statements of the same interviewee as well as further collected data. Specifically, the interviewee later told the interviewer (who at the time was a working student at Ottobock) that they would "tell him exactly what they told other Ottobock employees earlier". Also, other interviewees told us that sharing information is mandatory to order a certain product. Hence, considering the principle of **interaction between the researchers and the subjects**, our first interpretation *no data is shared*, was challenged. Going through another **hermeneutic circle**, we inferred two **further interpretations**: Either *data is shared and P8 wouldn't tell us,* or *our understanding of what is meant by data differed*. These interpretations were then again reflected and contextualized in further data collection and analysis.

Throughout data collection and analysis, we viewed our data from various theoretic lenses (e.g., paradoxes, tensions, motivation theories) as suggested by the principle of **dialogical reasoning**. Finally, applying the privacy calculus as a lens for our analysis, we can **abstract from and leverage the generalizability** of our interpretive analysis.

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