Barriers to Data Sharing among Private Sector Organizations

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Abstract

In today's digital world, sharing data among private sector organizations to realm mutual benefits, such as innovation and value co-creation, is considered a promising yet barely explored and realized approach. Although private sector organizations are pursuing data sharing, successful real-world examples are sparse due to a multitude of barriers. However, knowledge on barriers to data sharing among private sector organizations is scarcely existent in scientific literature. Therefore, we apply an exploratory research approach by triangulating insights from fourteen expert interviews and a systematic literature review to identify barriers which we group along five distinct perspectives. By exploring the multi-faceted barriers to data sharing among private sector organizations, our work contributes to a better understanding of data sharing in this field and lays the foundation for future studies. For practitioners, we identify key challenges to successful data sharing among private sector organizations and, hence call for additional endeavors in data sharing.

Keywords: Data Sharing, Barriers, Private Sector, Expert Interviews, Systematic Literature Review

1. Introduction

In today's digital world, the amount of gathered and stored data by private sector organizations continues to increase (Parvinen et al., 2020). While data has traditionally been seen as an internal resource to realize internal operational improvements, the usage of data by companies evolved far beyond in recent years (Cichy et al., 2021; Gelhaar & Otto, 2020; Parvinen et al., 2020). Today, many companies increasingly see data as a strategic asset, enabling them to innovate competitive and novel value offerings, use data as a tradable asset, and even disrupt existing value creation structures (Gelhaar et al., 2021c; Hunke et al., 2022). In the wake of data-driven innovation, sharing data among organizations in the private sector is a promising approach to complement a company's data by, different sources (e.g., process data, product data, and customer data) (Bagad et al., 2021; Dreller, 2018; Martin et al., 2021).

In this context, data ecosystems and data marketplaces are emerging structures accelerating data sharing (Abbas et al., 2021; Gelhaar et al., 2021b; Heinz et al., 2022a). Data ecosystems can be defined as "a set of networks composed of autonomous actors that directly or indirectly consume, produce or provide data and other related resources" (Oliveira and Lóscio, 2018, p. 4). A data marketplace reflects "a multi-sided platform that matches data providers and data buyers, and that facilitates business data exchange and financial transactions" (Abbas et al., 2021, p.2). The recent emergence of these artifacts and structures are driven by the aspiration to jointly create value and novel service offerings and leverage potentials of digital infrastructures to gain competitive advantages (Gelhaar et al., 2021b; Gelhaar & Otto, 2020; Russo & Feng, 2021). Data sharing is the constituent activity within the data ecosystem or between data marketplace participants. (Jagals & Karger, 2021).

Despite its potential to create additional value by combining data from different sources, multiple barriers impede the sharing of data among organizations, which is why many firms are reluctant to share their data (Enders et al., 2021; Heinz et al., 2022b; Krämer et al., 2021). While extant literature has primarily focused on examining data sharing in scientific and governmental contexts for the last two decades (e.g., Otjacques et al., 2007; Priego & Wareham, 2020), research on data sharing among private sector organizations has gathered momentum only within the last few years (Richter & Slowinski, 2019). As a result, knowledge of impeding and promoting factors for successful implementations of data sharing – especially in private sector organizations – is still sparse and highly fragmented. However, the holistic identification of barriers to data sharing has been put forward as a key foundation for developing an integrated approach and solutions for data sharing initiatives by private sector organizations (Dreller, 2018; Richter & Slowinski, 2019; van Veenstra & van den Broek, 2013). To address this

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research gap and contribute to the growing research field of data sharing among private sector organizations, we aim to answer the following research question (RQ) in this article:

RQ: What are the barriers to data sharing among private sector organizations?

To answer this question, we follow an exploratory research approach by conducting fourteen expert interviews from 10 companies and triangulating the results with a systematic literature review (vom Brocke et al., 2009; Webster & Watson, 2002). As a result, we identify 25 barriers categorized along five distinct perspectives that reflect the most important barriers to data sharing among private sector organizations from both a practical and scientific perspective. By outlining these multi-faceted barriers, we aim to raise awareness of the need for an integral, holistic approach to future research and practical initiatives and activities in the emerging field of data sharing among private sector organizations. For practitioners, we provide an overview of existing barriers to data sharing among private sector organizations, enabling them to address and counteract these barriers to data sharing activities and initiatives.

In the remainder of this article, we first elaborate on the foundations of data sharing and related work before describing the applied methodology. Then, we present the identified barriers grouped into five perspectives. Finally, we conclude by discussing the implications and limitations of our work.

2. Foundations and Related Work

In this section, we present the theoretical foundation of our research by explaining how our notion of data sharing among private sector organizations evolves from the existing literature. We then briefly outline how our work extends existing research in determining barriers to data sharing among private sector organizations.

Since data sharing is a phenomenon that touches several disciplines and research fields, there is no universally accepted definition but rather a variety of scientific definitions and descriptions (e.g., Dreller, 2018; Richter & Slowinski, 2019). In our context, we use the definition of the Support Center for Data Sharing (2022), which refers to data sharing as *"the collection of practices, technologies, cultural elements and legal frameworks that are relevant to transactions in any kind of information digitally, between different kinds of organizations."* In this sense, data sharing involves the collection and analysis of data by multiple individuals and institutions and goes beyond the pure transmission of final datasets. In addition, data sharing includes building and establishing complex information and communication infrastructure, initiating, establishing, and managing data-sharing processes and collaborations, taking legal boundaries into account, and accounting for cultural elements such as regional/national cultural differences or organizational culture (Arenas et al., 2019).

In science and practice, the term *data exchange*, which originates from the discipline of computer science, is often used synonymously for data sharing. (Awada & Kiringa, 2015; Dreller, 2018). Thereby, data exchange is described as *"the process of sending and receiving data in such a manner that the information content or meaning assigned to the data is not altered during the transmission."* (OECD, 2013). However, in contrast to data sharing, data exchange only describes the pure technical transmission of data neglecting (inter-)organizational practices, shared infrastructures, legal aspects, and cultural elements of sharing data (Awada & Kiringa, 2015).

A literature review on data sharing among private sector organizations reveals a highly fragmented research landscape. Van Panhuis et al. (2014) examine barriers to data sharing in a specific industry (public health) and determine six categories and a total number of 20 barriers. In addition, Kajüter et al. (2022) identify 35 barriers, grouped into six categories, that affect coordinated digital interaction and data sharing among healthcare stakeholders. Data sharing is tangent to various disciplines and extant literature reveals extensive research on data sharing barriers in an academic and governmental context (e.g., Otjacques et al., 2007; Priego & Wareham, 2020).

Data sharing among private sector organizations is a comparably novel, multi-faceted phenomenon (Dreller, 2018; Enders et al., 2022; Parvinen et al., 2020). Thereby, private sector organizations can be described as organizations with a majority of private ownership seeking to generate profit and not being owned or controlled by the government. However, existing literature in this field often focuses on examining a single or specific set of barriers, e.g., familiarity, risk, and trust in inter-organizational data sharing (Ibrahim & Nicolaou, 2011), governance challenges of inter-organizational value chains (Choi & Kröschel, 2015), challenges of (de-)anonymization for data sharing (Bampoulidis et al., 2020) or privacy concerns (Cichy et al., 2021), but without taking a holistic view of the barriers.

In addition, recent literature on data sharing among private sector organizations discusses the development of incentive mechanisms or investigates challenges, incentive mechanisms, and business models in the context of data ecosystems and data marketplaces focusing on data sharing among private

sector organizations (e.g., Abbas et al., 2021; Gelhaar et al. 2021b; Gelhaar, et al., 2021c, Gelhaar & Otto, 2020; van de Ven et al., 2021).

Despite the literature on specific barriers to data sharing among private sector organizations, existing research lacks a holistic view of barriers in this context. From the currently still highly fragmented research landscape, we derive the need to investigate the fundamentals of the data sharing phenomenon in research, such as identifying barriers independent of specific constellations (e.g., data ecosystems or data marketplaces) or specific industries to catalyze the field of data sharing among private sector organizations in both research and practice.

3. Research Approach

To achieve our goal of identifying barriers to data sharing among private sector organizations, the consideration of practical knowledge is of particular importance. Therefore, we take a qualitative research approach by linking two distinct data sources, expert interviews and a systematic literature review, to combine practical and scientific knowledge. In the following, we describe the research approach for the two data sources separately.

3.1. Expert Interviews

Expert interviews provide first-hand insights into emerging phenomena. To account for the exploratory nature of our research and the fast-growing practical relevance of the topic, expert interviews are well suited to explore barriers to data sharing among private sector organizations. Therefore, we conducted fourteen expert interviews from ten companies to obtain in-depth insights from industry experts involved in data sharing in the private sector. Three interviews (I10, I11, and I12) were collected between April and May 2020, and eleven interviews between January and April 2022. To combine structure with flexibility in the process and to account for the explorative nature of our study, we adopt a semi-structured interview approach and use open-ended questions to engage the experts to reveal their knowledge and experiences. The interviews are structured into two parts: First, we ask questions on data sharing aspirations, recent projects and initiatives, and implementation strategies. The second part of the interview is dedicated to the barriers faced regarding data sharing and how the organization tackles those. For the expert interview sample, we follow a purposeful sampling approach based on two criteria (Palinkas et al., 2015). First, experts must have profound knowledge and experience in data sharing among private sector organizations. Second, technical and business roles are considered to gain insights from various perspectives. All interviews are conducted virtually, last on average 51 minutes, and are recorded and transcribed for further analysis. Table 1 lists each informant's role, company affiliation, industry designation, and annual company revenue.

Table 1. Sample of the expert interviews

#	Role	Company	Industry	Annual revenue (USD in 2021)
I1	Manager Business Model Innovation	Alpha	Automotive	100-150 bn
I2	Director IT Innovation	Beta	Consumer Goods	10-50 bn
I3	Manager Digital Consulting	Gamma	Chemicals	50-100 bn
I4	Head of Data Assets	Delta	Insurance	50-100 bn
I5	Chief Enterprise Architect	Epsilon	Automotive	100-150 bn
I6	Key Account Manager	Gamma	Chemicals	50-100 bn
I7	Senior Manager Strategic Partnerships	Zeta	IT	< 1 bn
I8	Vice President Global Sales & Marketing	Eta	Industrial Goods	50-100 bn
I9	General Manager	Theta	Automotive	< 1 bn
I10	Co-CEO & Co-Founder	Jota	IT	< 1 bn
I11	Director Digital Transfomation	Kappa	Industrial Goods	1-10 bn
I12	Head of Sales	Lambda	IT	< 1 bn
I13	Manager Agricultural Solutions	Gamma	Agriculture	50-100 bn
I14	Manager Data Monetization	Gamma	Chemicals	50-100 bn

An initial set of codes of barriers is derived based on the expert interviews. The coding of the interview results follows an iterative approach with two coding cycles (Saldaña, 2015) inspired by the Gioia methodology (Gioia et al., 2013). We start by applying codes that represent impeding aspects for data sharing among private sector organizations, according to the 1st order concepts of the Gioia methodology (Gioia et al., 2013). To account for the explorative nature of the study, we apply an open coding approach. In a second step, we apply axial coding, which aggregates the derived codes into barriers inspired by the 2nd order themes of the Gioia methodology (Gioia et al., 2013). In this process, the coding procedure is conducted independently by two researchers to ensure the consistency of the results. Discrepancies are mutually resolved by discussion. The barriers are further categorized into perspectives building the 3rd order dimensions of the Gioia methodology (Gioia et al., 2013). The final step of categorization reveals five dimensions. These are delineated from the repetitive mentioning of perspectives in the interviews and verified by two independent researchers by inductive grouping. Further, the derived codes are the basis for analyzing the second data source, the systematic literature review.

3.2. Systematic Literature Review

To address the existing literature on the barriers to data sharing among private sector organizations, we conduct a systematic literature review that follows established methods and procedures in information systems (IS) research (vom Brocke et al., 2009; Webster & Watson, 2002). While exhaustiveness cannot be guaranteed, creating a search term based on reviewing an initial sample of literature on the phenomenon and collecting synonyms as well as strongly overlapping descriptive terms in an iterative process allows us to include extant and adjacent literature in the field (vom Brocke et al., 2009). While extant literature mainly focuses on data sharing in a governmental or scientific context, data sharing in the private sector is very limited. Therefore, we neglect to further limit the search results to the private sector as barriers to data sharing in these domains also allow us to derive barriers to data sharing among private sector organizations. To apply our search string, we choose Web of Science and Scopus as popular databases and complement the sample with results from the AIS eLibrary. We further limit our results to the Senior Scholars' Basket of Eight, the VHB JourQual-3 IS outlets, and six leading IS conferences (e.g., International Conference on Information Systems). In making this selection, we ensure to adhere to scientific standards such as articles being peer-reviewed.

The literature search leads to a total of 141 articles. After removing 22 duplicates, we obtain a sample of 119 articles for further screening. A manual assessment of each article's relevance in two steps, first by reviewing the abstracts and then by full-text screening, results in a sample of 34 papers relevant to our research. The reduction in articles is due to the exclusion of articles that are not primarily focused on data sharing and articles with a strong technical focus on data exchange. The conducted forward and backward search (Webster & Watson, 2002) adds seven articles to our sample, resulting in a final literature sample of 41 articles. Figure 1 depicts a summary of the literature search process.

The literature coding follows a semi-open coding approach by applying provisional coding, according to Saldaña (2015), which is particularly appropriate for qualitative research that builds on previous research and investigations (Saldaña, 2015). The coding process uses a set of predetermined codes, such as those generated from previous research findings. Based on the findings, these codes are revised, modified, deleted, or expanded, and new codes are included (Saldaña, 2015). The codes generated from the expert interviews represent the predetermined code

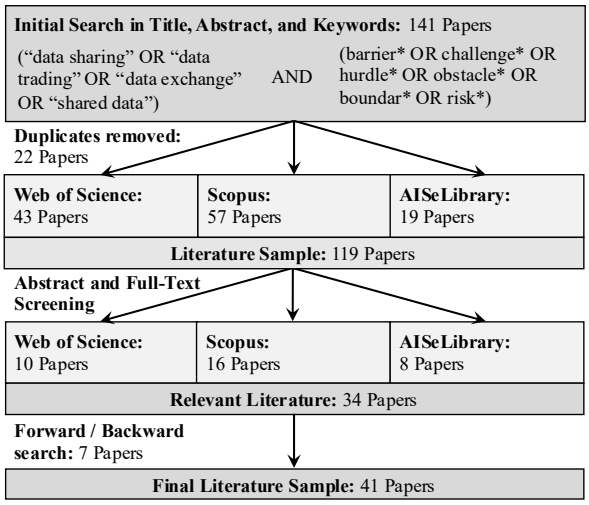

Figure 1. Literature search process

set, which we apply in the provisional coding cycle to analyze the obtained literature sample. The literature analysis reveals additional impeding aspects for data sharing among private sector organizations, leading to a revision and extension of the barriers derived from the expert interviews. However, no codes representing additional barriers could be identified. Therefore, the analysis and triangulation of the two data sources led to a total of 25 identified barriers to data sharing among private sector organizations, which were inductively categorized into five perspectives.

4. Barriers to Data Sharing among Private Sector Organizations

Many organizations in the private sector face significant difficulties in sharing their data among private sector organizations, despite recognizing the potential for joint value creation and the innovation of new service offerings. In the following section, we provide an overview of the barriers by triangulating exploratory insights from 14 expert interviews with the existing body of scientific knowledge. We shed light on barriers from a strategic, operational, technological, cultural, and regulatory perspective by identifying and discussing 25 barriers. This analysis focuses on barriers for individual companies to participate in data-sharing activities. The derived barriers and perspectives reveal a field of challenges that is highly interconnected, dynamic, and, in some cases, mutually dependent. The barriers can be derived from Table 2 and are described in more detail in the following subsections.

4.1. Strategic Perspective

The strategic perspective includes barriers that directly impact strategic direction and design and the decision-making for participation in data-sharing activities among private sector organizations.

S1. Lack of management commitment and corporate strategy integration. Since data sharing is not part of most companies' core business, many private sector organizations' data-sharing activities are project-based and driven by individual departments to achieve "quick wins" (I1, I2, I10). To unleash the full potential of data sharing, top-down commitment is indispensable, yet mostly nonexistent, or even limiting data sharing activities by preventing decisions (I3, I9, (Khurana et al., 2011). Furthermore, the lack of integration of data sharing into the corporate strategy leads to a fragmented project landscape oriented towards individual problems rather than a long-term strategic direction (I3, I13, Abbas et al., 2021).

S2. Lack of incentives and prospects. Many organizations weigh risks more heavily than potentials due to uncertainty about monetary and non-monetary added values (e.g., monetary rewards, customer loyalty, or strategic market position) (I10, Gelhaar et al., 2021c). Therefore, internal and external incentives (e.g., monetary reward, organizational culture, contributing to the general public or publicly funded projects) are needed to encourage data sharing among private sector organizations (I3, I7, I10, Gelhaar et al., 2021a; Gelhaar et al., 2021c).

S3. Use case identification. Identifying use cases for data sharing among private sector organizations is a time-consuming and complex process and thus an essential prerequisite for incentivizing data sharing in the private sector (I3, I7, van Veenstra & van den Broek, 2013). However, identifying use cases proves to be difficult as no approaches exist to identify use cases systematically. Further, this process faces several challenges, such as lack of transparency about existing data, creativity for novel value-added services, unclear benefits for each participant, and scalability of potential use cases (I7, I8, I11, I12, I14, Gascó et al., 2018).

S4. Initiation and establishment of suitable partnerships. Collaboration with partners in sharing data is associated with many diverse factors such as data requirements, trust issues, competition, and

Table 2. Identified barriers to data sharing among private sector organizations

Perspective	Barrier	Interviews	Literature
Strategic	S1. Lack of management commitment and corporate strategy integration	I1, I2, I3, I4, I5, I6, I7, I9, I10, I13	e.g., Abbas et al. (2021), Khurana et al. (2011), van Veenstra & van den Broek (2013)
	S2. Lack of incentives and prospects	I1, I3, I4, I5, I7, I10	e.g., Gelhaar et al. (2021), Kajüter et al. (2022), Gelhaar, Both et al. (2021)
	S3. Use case identification	I3, I5, I6, I7, I8, I9, I11, I12, I14	e.g., Gascó et al. (2018), Gelhaar, Both, et al. (2021), van Veenstra & van den Broek (2013)
	S4. Initiation and establishment of suitable partnerships	I1, I3, I5, I6, I8, I9, I12, I14	e.g., Gelhaar & Otto (2020), Gelhaar, Both, et al. (2021), van Veenstra & van den Broek (2013)
	S5. Uncertainty about the value of data	I1, I3, I7, I8, I9I11, I12, I13, I14	e.g., Abbas et al. (2021), Gelhaar et al. (2021), Otto & Jarke (2019)
	S6. Lack of revenue models and scalability	I1, I3, I5, I6, I8, I9, I10, I12, I13	e.g., Gelhaar et al. (2021), Spiekermann et al. (2015), Kajüter et al. (2022)
	S7. Unclear opportunity costs and funding	I1, I3, I5, I12,	e.g., Abbas et al. (2021), Gascó et al. (2018), Kajüter et al. (2022)
	S8. Fear of external dependencies on data and infrastructure	I5, I8, I9, I13	e.g., Choi & Kröschel (2015)
	S9. Fear of transparency and disclosure of competitive knowledge	I3, I7, I8, I12, I13, I14	e.g., Bastiaansen et al. (2019), Cichy et al. (2021), Otto & Jarke (2019)
	S10. Fear of economic damage	I8, I9, I14	e.g., Khurana et al. (2011), van Panhuis et al. (2014), van Veenstra & van den Broek (2013)
Operational	O1. Lack of competencies and resources	I1, I2, I4, I5, I6, I8, I9, I10, I12, I13	e.g., Khurana et al. (2011), van Panhuis et al. (2014), Zeiringer (2021)
	O2. Unclear responsibilities and decision-making processes	I1, I2, I3, I8, I9, I12, I13, I14	e.g., Shin (2017), Vesselkov et al. (2019)
	O3. Fear of data privacy violations	I1, I4, I5, I11	e.g., Chowdhury et al. (2020), Lawrenz & Rausch (2021), van den Broek & van Veenstra (2015)
Technological	T1. Limited data availability and accessibility	I1, I3, I4, I10, I12, I13, I14	e.g., Bastiaansen et al. (2019), Gelhaar et al. (2021), Otto & Jarke (2019)
	T2. Lack of data processing and validation mechanisms	I1, I2, I3, I8	e.g., Choi & Kröschel (2015), Lawrenz & Rausch (2021), van de Wetering & Versendaal (2018)
	T3. Lack of technical infrastructure and data compatibility	I2, I3, I5, I6, I7, I8, I10, I12	e.g., Choi & Kröschel (2015), Khurana et al. (2011), van de Wetering & Versendaal (2018)
	T4. Lack of data security mechanisms	I1, I4, I5, I11, I13	e.g., Chowdhury et al. (2020), Lawrenz & Rausch (2021), van den Broek & van Veenstra (2015)
	T5. Lack of data quality and metadata	I4, I5, I6, I13	e.g., Choi & Kröschel (2015), van Panhuis et al. (2014), van Veenstra & van den Broek (2013)
Cultural	C1. Mindset and cultural differences	I2, I3, I4, I5, I7, I10, I14	e.g., Kajüter et al. (2022), Khurana et al. (2011), van Veenstra et al. (2013)
	C2. Lack of trust in appropriate data usage	I2, I9, I10, I11, I14	e.g., Bastiaansen et al. (2019), Chowdhury et al. (2020), Gelhaar & Otto (2020)
	C3. Fear of loss of control	I1, I5, I8, I10, I13	e.g., Cichy et al. (2021), Khurana et al. (2011)
Regulatory	R1. Legal compliance and contract design	I1, I4, I8, I10, I11, I12, I13, I14	e.g., Gelhaar & Otto (2020), Kajüter et al. (2022), van den Broek & van Veenstra (2015)
	R2. Unclear data ownership and usage rights	I5, I8, I10, I11, I14	e.g., Gelhaar & Otto (2020), Pant et al. (2018), Spiekermann et al. (2015)
	R3. Restrictions by law (regional, national, and international)	I2, I5, I8, I10, I11, I12, I13	e.g., Kajüter et al. (2022), Susha & Gil-Garcia (2019)
	R4. Lack of standards, guidelines, and frameworks	I2, I8, I10, I11, I13	e.g., Choi & Kröschel (2015), Lawrenz & Rausch (2021), van Panhuis et al. (2014)

different goals of the respective partners (e.g., from the provider perspective: trust in appropriate usage or fear of competitive disadvantages; from the consumer perspective: required data availability and quality (I1, I5, I13, van Veenstra & van den Broek, 2013). In addition, when partnering in a cross-industry setting, data sharing is becoming even more complex due to heterogeneous perceptions and goals (I3).

S5. Uncertainty about the value of data. Many organizations are just at the beginning of exploring data as an asset and struggle to determine the value of data (Abbas et al., 2021). General knowledge about the valuation of tangible assets such as manufactured products is not transferrable to intangible assets such as data (I1, I8, I14). In addition, approaches to structurally monetizing data are still in their infancy and hamper determining mutual benefits to all stakeholders when private sector organizations share data (I1, I7, I8, Parvinen et al., 2020).

S6. Lack of revenue models and scalability. Revenue models and scalability are decisive factors for private sector organizations to share data for various reasons, such as private sector organizations' pursuit of economic growth and facilitation of risk evaluation (I1, I3, I12). However, due to the uncertainty about the value of data, practitioners and researchers struggle to develop and establish revenue models, are uncertain about their scalability, and therefore represent a strong inhibiting factor for data sharing in the private sector (I6, I10, Kajüter et al., 2022).

S7. Unclear opportunity costs and funding. The opportunity costs of data sharing cannot be determined, resulting in subjective decisions based on the risk affinity of the data provider and missed opportunities for data sharing (I3, I12). In addition, funding data-sharing projects, which are mostly investment-intensive, is a challenge. Regularly, data sharing fails because it is not part of the core business and thus falls victim to a lack of financial resources. (I1, I12).

S8. Fear of external dependencies on data and infrastructure. Private sector organizations fear the use of external data sources and infrastructure shared by partners due to risks such as, e.g., dependency on data delivery and data quality, as well as future provision, maintenance, and interoperability of the infrastructure used (I5, I9). Although various experts mention this aspect as a barrier to data sharing, it is barely addressed in extant literature.

S9. Fear of transparency and disclosure of competitive knowledge. Private sector organizations operate in a highly competitive environment. As a result, many organizations are reluctant to share data among organizations due to the fear of transparency that could allow the inference of knowledge (e.g., confidential knowledge about products or research and development) and the disclosure of competitive knowledge (I7, I13, I14, Cichy et al., 2021).

S10. Fear of economic damage. Data sharing among private sector organizations entails the risk of economic damage that may be caused to data providers (I8, van Panhuis et al., 2014). For example, economic damage could result in loss of brand reputation, financial losses, and legal penalties due to misuse of shared data by data consumers and data breaches (I8, I9, Khurana et al., 2011).

4.2. Operational Perspective

The second perspective comprises three barriers that primarily affect the operational execution of data sharing among private sector organizations from an organizational perspective rather than technical feasibility.

O1. Lack of competencies and resources. The implementation of data sharing among private sector organizations is accompanied by novel requirements on competencies (e.g., decision-making competencies, legal competencies, or technological and data science competencies) that are not yet present in many organizations (I4, I5, I7, Zeiringer, 2021). Furthermore, the efficiency-focused culture of organizations impedes data sharing because it is not yet part of the core business and requires additional human and technical resources (I5, I8, I13, van Panhuis et al., 2014).

O2. Unclear responsibilities and decision-making processes. Aspects such as unclear data ownership, lack of reference cases, and the need to involve multiple departments raise questions about decision-making processes and responsibilities (I3, I14, Vesselkov et al., 2019). Unclear responsibilities, such as allocating the revenue from data sharing, ensuring appropriate usage of shared data, and lack of decision-making processes, such as undefined decision-making authority, hamper the operational process of data sharing (I8, I13, I14, Shin, 2017).

O3. Fear of data privacy violations1 Although this aspect could also be a strategic barrier, the fear of privacy violations is mostly mentioned in the operational context by the interviewees. For example, data providers fear sticking to privacy compliance when deciding, preparing, and processing data for sharing, as well as data privacy compliance of data consumers and intermediaries when distributing and using the data (I1, I4, I11, Chowdhury et al., 2020).

4.3. Technological Perspective

The third perspective constitutes six technological barriers to IT infrastructure and data as a digital asset to be shared that impede data sharing among private sector organizations.

T1. Limited data availability and accessibility. Data landscapes, especially in large enterprises, have grown historically, resulting in a multitude of databases, systems, and applications that lack transparency of the existing data landscape (I1, Bastiaansen et al., 2019). In addition, data hunting by private sector organizations to satisfy data needs is increasing. Still, it is hampered by a lack of approaches to identify available data and access it, e.g., due to privacy concerns by data owners (I1, I3, I14).

T2. Lack of data processing and validation. Data processing and validation pose multiple challenges to organizations. For example, while data processing requires data science skills, technological capabilities, data formatting, and interoperable data infrastructures, many data-sharing activities fail due to these challenges (I2, I8, Choi & Kröschel, 2015). Furthermore, the lack of validation mechanisms hampers data sharing in the private sector due to uncertainties about data origin, data quality, and data completeness (I1, I8).

T3. Lack of technical infrastructure and data compatibility. Even if private sector organizations are willing to share data, many data sharing activities are hindered by a lack of reference architectures, data models, technological interoperability, and data compatibility among organizational systems (I2, I5, I8 van de Wetering & Versendaal, 2018).

T4. Lack of data security mechanisms. For data sharing, secure data transmission and the security of data consumers' databases and systems are decisive factors for private sector organizations (I5, Chowdhury et al., 2020). Fear of, for example, unauthorized third-party access, data breaches, and cybercrime requires novel data security mechanisms such as data encryption, anonymization, or firewalls to promote trust and thus the decision to share data (I5, I11, Chowdhury et al., 2020).

T5. Lack of data quality and metadata. While data has been collected extensively by private sector organizations, aspects of data quality such as data preparation, data maintenance, and data formats have been given a subordinate role, which now has a limiting effect on the secondary use of shared data (I4, I5, (van Veenstra & van den Broek, 2013). Furthermore, there is a lack of metadata describing, e.g., the content, methods, and origins of data, which impedes data sharing due to limited secondary data usage (I4, I13, van Panhuis et al., 2014).

4.4. Cultural Perspective

The fourth perspective of cultural barriers encompasses three socio-cultural aspects of an organization and its employees that hinder the willingness to share data among private sector organizations. Due to interconnectivity, barriers from the cultural perspective condition the barriers from the strategic perspective.

C1. Mindset and cultural differences. In many organizations, a culture of risk aversion to data sharing for competitive reasons has been established in the past, manifesting itself in the mindset of management and employees (I7). In terms of data sharing, this mindset needs to change to, for example, incorporate data as a strategic asset, enable unbiased decision-making, and establish strategic partnerships and use cases to unfold the full potential of data sharing (I3, I7, I14, Kajüter et al., 2022). Furthermore, additional cultural differences by region or country (e.g., historical openness versus restriction to sharing data) may exacerbate these barriers to data sharing among private sector organizations across different regions and countries (I7, Khurana et al., 2011).

C2. Lack of trust in appropriate data usage. Trust plays a key role in data sharing among private sector organizations, and therefore lack of trust is an essential challenge (I10, I14, Gelhaar & Otto, 2020). Many organizations are reluctant to share their data because data processing and analysis are opaque to data providers, which is associated with the fear of inappropriate use, such as misinterpretation of data, inference with core business, or economic, reputational, or social harm.

C3. Fear of loss of control. Sharing data among private sector organizations is frequently associated with loss of control over data and lack of knowledge about data usage or even potential (unauthorized) disclosure of data by data consumers (I5, I10, Cichy et al., 2021). Particularly, since sharing data once is non-reversible, organizations carefully consider what data to share and, when in doubt, tend not to share data because risks and vulnerability are weighted more heavily than realizable potential (I5, I8).

4.5. Regulatory Perspective

The fifth perspective incorporates four legal and fundamental structural barriers in the regulatory apparatus that impede or even restrict data sharing among private sector organizations.

R1. Legal compliance and contract design. Sharing data among private sector organizations is mostly initiated and secured by individual contracts in order to minimize mutual risks and clearly define, e.g.,

the scope, time frame, volume, and quality of the data sharing activity (I11, I12, Kajüter et al., 2022). Therefore, due to the multi-faceted aspects of contract design and the need to comply with legal requirements such as, e.g., cartel rights, contracting often takes several months, leading to the failure of many data sharing activities in an increasingly dynamic data world (I1, I13, I14, Gelhaar & Otto, 2020). In addition, the unclear definition of sanctions for non-compliance and contract breaches implies a further obstacle to data sharing (I8).

R2. Unclear data ownership and usage rights. Increasing global interconnectivity, e.g., through growing diversified supply chains and industrial collaboration, leads to conflicts of data ownership and usage rights (I8, I10, I14, Pant & Yu, 2018). Therefore, within and especially among organizations, clearly defined data ownership and usage rights (e.g., through the law, policies, or legal rights) are indispensable perquisites decision-making (I8, I11).

R3. Restrictions by law (regional, national, and international). While regulators are attempting to open the boundaries of organizations in terms of access and use of data to the general public, such as through the European Data Act, and attempting to enforce data transparency by law (e.g., through the German Supply Chain Act), various restrictions such as the European Union's General Data Protection Regulation or cartel rights still hinder data sharing among private sector organizations (I5, I6, I10, I11, Susha & Gil-Garcia, 2019). In particular, data sharing across regulatory boundaries is subject to international regulatory dynamics that complicate long-term partnerships and contracting, further impeding decision-making regarding data sharing among private sector organizations (I11, I13).

R4. Lack of standards, guidelines, and frameworks. The willingness of private sector organizations to share data with each other is further impeded by a lack of standards, guidelines, and frameworks, such as standardization of contract design or a standardized infrastructure for secure and trustworthy data sharing as is currently being attempted to implement with the project GAIA-X (I8, I11, I13, Choi & Kröschel, 2015). Further, guidelines and frameworks provided by regulatory and standardization institutions such as DIN and ISO are still lacking. However, they have the potential to break down existing barriers and promote data sharing among private sector organizations (I2, I8, I11).

5. Conclusion and Future Research

In this work, we identify existing barriers to data sharing among private sector organizations which we have identified as a key cornerstone of an emerging and highly relevant research field (Kajüter et al., 2022; Zeiringer, 2021). By conducting 14 expert interviews and triangulating the results with a systematic literature review (vom Brocke et al., 2009; Webster & Watson, 2002), we identified 25 barriers along five perspectives: strategic, operational, technological, cultural, and regulatory. Throughout the analysis of the data collected through expert interviews and a literature review, it became evident that data sharing among private sector organizations is a multi-faceted phenomenon that exhibits a high degree of fragmentation and lacks a systematic examination of existing barriers. By examining these barriers from multiple perspectives at the intersection of research and practice, we provide a holistic view of the barriers to the phenomenon of private sector data sharing.

This study offers theoretical implications that contribute to a deeper understanding of the emerging phenomenon of data sharing among private sector organizations and promotes an integral understanding of existing barriers. By compiling and structuring comprehensive evidence from research and practice, we synthesized existing knowledge of barriers to data sharing among private sector organizations, as such a review has so far been omitted. The identified barriers along the five perspectives can help practitioners and researchers understand the existing challenges to private sector data sharing. They also provide evidence of the diversity and variety of barriers, laying the foundation for developing approaches to facilitate data sharing in the private sector.

For practitioners, the results of this work increase awareness and transparency regarding barriers to data sharing among private sector organizations. By linking practical knowledge to existing literature, we provide concrete evidence of the multi-faceted barriers and their interconnectivity. Therefore, we call for a holistic consideration of the interconnected barriers and integral solution approaches to lay the groundwork for unleashing the potential of private sector data sharing. By highlighting the diversity of barriers, we expect to encourage integral approaches to solutions, thereby expanding the universe of future studies and practical efforts in this research field.

Despite aiming for a high level of rigor, our work has certain limitations and thus offers opportunities for future research. First, we can hardly argue for exhaustiveness as selecting a different expert sample, or a different set of keywords and outlets for the literature review may reveal additional results. Due to the multitude of interdisciplinary barriers, adding experts with a regulatory or legal background and including outlets in other disciplines such as organizational behavior or computer science could add

valuable additional insights. Further, as qualitative data has been collected in the private sector, a non-response bias due to business confidentiality may have impacted our results. In addition, the expert sample considered mostly historically grown, large firms and thus neglects small and medium-sized enterprises and companies born in the digital age for which other barriers to data sharing could exist. Furthermore, while data has been collected across various industries, our identification of barriers to data sharing aims to depict a generalized landscape of barriers neglecting certain barriers that may apply to specific industries.

While this study lays the qualitative foundations on barriers to data sharing among private sector organizations, we urge researchers to quantitatively assess the barriers regarding their relevance and generalizability across industry sectors. In addition, the identified barriers are highly interconnected. Therefore, understanding the relationships between the individual barriers and their influence on each other are an essential prerequisite for developing integral and holistic solution approaches and thus, successfully establishing data sharing among private sector organizations. Furthermore, future work should also examine the various potentials and benefits of data sharing among private sector organizations to incentive and facilitate data sharing initiatives among private sector organizations.

Overall, we see great potential in the emerging field of data sharing among private sector organizations in both research and practice. We hope that our work contributes to understanding the multitude of barriers impeding data sharing among private sector organizations and move the necessity of integral consideration and approaches into focus to catalyze data sharing among private sector organizations and support to "launch the rocket."

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