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Managing Customer Data in Data-driven Service Innovation: A Framework of Data Principles

Research Paper

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Abstract. While customer data has been collected in enterprise systems since decades, the emerging consumer technologies create new sources of data. Although the need to co-create services with customers has been recognized, a systematic approach of how to include this sensitive source of innovation in the service innovation process is still lacking. This research explores the potential of data governance practices for data-driven service innovation. Data principles for the governance of customer data are collected and assessed by practioners in order to provide conceptual support for organizations and to facilitate the service innovation process. The results of this research integrate data principles of different research streams and offer a framework of data principles that can be applied in the design and management of data-driven services.

Keywords: Data Governance, Customer Data, Data-driven Service Innovation.

1 Introduction

The rising number of digital touchpoints and smart devices in the consumers' everyday lives generate large amounts of digital traces (Lim et al. 2019). In these data-rich environments (Troilo et al. 2017), a wealth of customer data emerges via smart devices, social media, and various application systems and becomes a decisive factor for service innovation and new data-driven services. However, concepts and methods of how new services can be designed from this data is still developing. Although companies are eager to "cash in" on their data (Bitkom 2022; Wixom 2014), they often lack the knowledge of how to fully take advantage of data and analytics for expanding their portfolio with data-driven services (Hunke et al. 2022; Schüritz et al. 2017). Data-driven service innovation has emerged as a particular research stream putting data and analytics as driving resources in the innovation process (Lim et al. 2018; Engel and Ebel 2019; Schymanietz 2020). Yet, research on methodological support that integrates data and analytics into service innovation activities is still in its infancy (Engel and Ebel 2019; Fruhwirth et al., 2020). Further, organizations which strive to exploit customer

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data in particular, must comply with legal regulations, ensure privacy rights and guarantee trust in the communication with customers (Spiekermann et al. 2015; Schäfer et al. 2022).

Data governance as a cross-functional discipline addresses these challenges and aims at managing data as a strategic asset of an organization (Alhassan et al. 2019; Abraham et al. 2019). For this purpose, *data principles* define boundary requirements for data usage. They represent guidelines for data governance activities and provide directions for the use of data over its lifecycle (Khatri and Brown 2010; Brous et al. 2016; Alhassan et al. 2019). Organizations can benefit from data governance practices to leverage data and analytics opportunities for data-driven services (Mikalef et al. 2018; Mikalef et al. 2020; Potiguara et al. 2020). Yet, with the rising importance of the customer in producing and exchanging customer data with an organization, especially in the context of data-driven services (Lim et al. 2019), the question of how to deal with customer data comprehensively in data governance gains importance. Customers are not only "creators" of data anymore (Lim et al. 2019), but they adopt an active role in service configuration as well as service operations (Alt et al. 2019; Beverungen et al. 2019; Ostrom et al. 2015). If data governance should support the design of data-driven services using customer data, it must not only ensure data privacy and security, but also incorporate the active role of customers. Thus, data principles must ensure customer sovereignty (Nomura et al. 2020; Koskinen et al. 2019) in the production, management and consumption of their data (Chaudhry et al. 2015; Tapsell et al. 2018).

This research aims to identify and assess data principles for data-driven service innovation focusing specifically on customer data from both, a theoretical and practical perspective. For this purpose, the following research question guides the research activities: *How can data principles for customer data be incorporated into data-driven service innovation?* For answering this research question, data principles, as key requirements guiding the governance of customer data, are in a first step collected and classified into different groups of data principles. For this purpose, different literature streams are synthesized. In a second step, experts are interviewed to identify the relevance and challenges involved in putting these principles into practice. Finally, first conceptual knowledge is developed to assist organizations in data-driven service innovation initatives when working with customer data. The remainder of the paper is structured as follows. Section 2 outlines related work. Section 3 gives an overview of the research design. Section 4 outlines the data principles and the research results. Finally, contributions and research limitations are presented.

2 Theoretical Foundation

2.1 Data-driven Service Innovation

Service innovation is defined as the "rebundling of diverse resources that create novel resources that are beneficial (i.e., value experiencing) to some actors" (Lusch and Nambisan 2015, p.161). The discpline represents a rather heterogenous research field with

various sub-streams, such as service design, service engineering or new service development that attempt to develop and manage new services (Beverungen et al. 2018; Kurtmollaiev and Pedersen 2022; Patrício et al. 2018). Data-driven service innovation has emerged as a particular research stream. The discipline focuses on leveraging data and analytics within the entire process of service innovation and looks at data and analytics as an analytical unit for the exploration, validation or value generation of new services (Demirkan et al. 2015; Engel and Ebel 2019; Schymanietz 2020). Yet, research on methodological support that integrates data and analytics more deeply into service innovation activities is only about to gain momentum (Fruhwirth et al. 2020). As companies still lack the comprehensive knowledge of how to fully take advantage of data and analytics, more conceptual work is necessary that supports service organizations with the appropriate instruments to design and manage new data-driven services (Schüritz et al. 2017; Blöcher and Alt 2022).

2.2 Data Governance

Data governance represents a cross-functional framework for managing data as a strategic enterprise asset of an organization (Alhassan et al. 2019; Abraham et al. 2019; DAMA International 2009). The management approach takes care of the "valuation, creation, collection, analysis, distribution, storage, use and control of information" (Kooper et al. 2011, p. 196). Data governance practices consist of the definition of decision rights and accountabilities regarding the use of data (Khatri and Brown 2010; Abraham et al. 2019) and strive to maximize its value (Kooper et al. 2011; Tallon et al. 2013). Data principles in particular represent key requirements providing directions for decisions that affect the way data is managed, accessed, processed, distributed and valued (Abraham et al. 2019; Khatri and Brown 2010; Micheli et al. 2020). Due to the rising awareness of data as an organizational asset, the necessity for data governance has grown in the last years (Abraham et al. 2019; Legner et al. 2020). In parallel, AI governance is emerging as another layer of data governance, emphasizing the need for governance mechanisms allowing the trustworthy use of artificial intelligence (Cath 2018; Dafoe 2018; Fadler and Legner 2021; Papagiannidis et al. 2022). Data governance mechanisms have a positive impact on innovation capabilities in organizations (Mikalef et al. 2020). Thus, aspects, such as legal compliance, data quality and security must be taken into account from the beginning when designing new data-driven services (Kühne and Böhmann 2018; Sammon and Nagle 2017).

2.3 Customer Data for Data-driven Service Innovation

Customer data, also called personal data, denote data that can be linked to a specific person (European Commission 2016) and represent an essential part of the rising big data resources. Customer data include not only the customer's demographic or contact information, but also refer to behavioral data, such as the customer's purchase history or device usage data. Even if this type of data has long been applied by companies for CRM or data-driven marketing (Stone et al. 2004; Wedel and Kannan 2016), the use of

this data as a design material for the customer's value creation represents a recent phenomenon (Lim et al. 2019; Saarijärvi et al. 2014; 2016; Seidelin et al. 2020). Personal assistants have emerged that transform personal data into valuable information or self-monitoring services to augment human capabilities and to improve the customers' quality of living (Alt et al. 2021; Demirkan et al. 2015). But, the use of customer data is associated with several requirements: Service providers must ensure privacy regulations as well as data security and need to create trust when working with this data (Huhtala 2018, Kunz et al. 2017; Spiekermann et al. 2015). With the rising importance of the customer in producing and exchanging data with an organization, the customer's sovereignty in the production, management and consumption of their data must be ensured (Tapsell et al. 2018; Nomura et al. 2020; Koskinen et al. 2019). Consequently, data governance principles should provide guidance on how to leverage the potential of data for the customer and consider under which conditions this data can be utilized.

3 Methodology

This research follows a two-stage research approach. In the first phase, a structured literature review (LR) is conducted to systematically analyse the literature for data principle identification as transparent and rigour as possible (Vom Brocke et al. 2009). The second research phase strives to assess the current relevance of the identified principles just as current challenges in their implementation by means of interviews. Table 1 presents the different steps of the structured LR. It took place in Q4 2020 in a sequential process focusing on different literature streams (cf. Table 3). For this purpose, the four bibliographic databases Emerald, IEEE, ACM Digital Library, Springer were screened and a supplementary dedicated search on A+ and A Ranked Journals in Information Systems and Marketing/Services was conducted to ensure a borad coverage of high quality sources and to refine the research results. For searching and filtering the databases and journals, a keyword-based approach was chosen. The first search strings strive to identify concrete data principles using the combinations "*Data Governance" AND "principle" AND "personal data" OR "customer data" OR "Information Governance" AND "principle" AND "personal data" OR "customer data"*. To broaden the search scope, another keyword search was performed using the combinations *"CRM"AND "personal data"OR"customer data;"CRM"AND"information management";"CRM"AND"data management"; "service" AND"personal data"OR"customer data"AND "information management" OR "data management"* related to data governance and service management. In the second step, the abstracts and titles were screened for filtering out potential contributions. Subsequently, the resulting articles were analyzed in detail for the presence of data principles or conceptual knowledge represented as *models, frameworks or patterns* related to *requirements, guidelines or success factor or even blueprints* for the management of customer data. The third step constitutes a back and forward research. After deduplication and the final investigation, 51 relevant papers emerged and a concept-centered analysis as suggested by Weber and Watson (2002) was performed to group the results into *legal, business and customer-orientated data principles*. When principles are grounded on regulatory requirements

or laws (Alhassan et al. 2019), they are categorized as *legal-orientated principles*. Those relate to regulatory necessities and policy guidelines. In contrast, *business-orientated principles* are requested by IT or business stakeholders (Alhassan et al. 2019). They add another layer that and are mainly driven by business requirements. Finally, *customer-orientated principles* put the customer into the foreground of data management. They consider the customer's active role and strive to maximize data value for the customer.

Table 1. Overview of the Literature Review

Step 1: Key word-based search (*including both keyword combinations*)		
Source	*Restriction and settings*	*Results*
(1) Emerald	(1) Focus on journal articles, Book chapters, case studies (2) Date range: 2000-2020	922
(2) IEEE	(1) All metadata, (2) Date range: 2000-2020	243
(3) ACM	(1) Date range: 2000-2020	957
(4) Springer	(1) Include preview content only, (2) Data governance in title OR customer/personal data in title, (3) Date range: 2000-2020	233
(5) Journals	A+/A ranked journals in IS & marketing/service research based on VHB Joural Ranking	228
Step 2: Abstract and title reading		322
Step 3: Search for principles and conceptual knowledge		140
Step 4: Extension of the results set by forward and backward search		64
Step 5: Deduplication and final identification of data principles		**51**

Table 2. Overview of the Interviewees

No.	**Firm**	**Role**	**Industry**
1	Consultant	Founder Data/Analytics Consultancy	Media, Public Organizations
2	Enterprise	Product Owner, Data Lake	Mobility
3	Enterprise	Director Analytics	E-commerce
4	Consultant	Senior CRM Consultant	E-commerce
5	Consultant	Teamlead Architecture & Solutions	E-commerce, Energy, Retail
6	Consultant	Principal Consultant	Banking, Insurances
7	Start-up	Teamlead Analytics	Recruiting Service Provider

In the seconed research phase, semi-structured interviews (Myers and Newman 2007) with data and analytics experts in Q1/Q2 2021 were performed. For this purpose, a theoretical sampling approach was chosen. Interviewees (see Table 2) were selected due to their long-year experience in CRM, analytics and data governance (Eisenhardt and Graebner 2007). The interviews were conducted online with a duration of 90 minutes. The extracted data principles from the LR guided the semi-structured interviews. For each principle, three questions formed the basis, i.e., the understanding, the

current implementation and the perceived relevance. The relevance for organizations and the personally perceived relevance of the interviewee were assessed with two structured questions using a likert-scale from 1 to 5 (Likert 1932) and two open questions. In respect to current practices, the surveyed consultants are asked how they advise their clients regarding the principles' implementation. The data has a descriptive function to gather knowledge around current organizational practices. A cross-case synthesis (Yin 2009) is conducted. The data is coded and analyzed along the dimensions (1) current practices (2) the perceived relevance of each data principles and (3) current drivers and challenges by two researchers in two independent rounds and one final joint discussion until their identified groups matched.

4 Results

4.1 Data Principles in Literature

Data principles characterize key guidelines of data governance activities (Khatri and Brown 2010; Brous et al. 2016; Alhassan et al. 2019). They must include shared decision-making over data assets and activities just as policies, standards and procedures (Brous et al. 2016; Ladley 2019; Wong et al. 2020). The data principles obtained from the LR are categorized in Table 4 *as legal-, customer- and business-orientated* principles representing key requirements for data-driven services. Table 3 provides an overview of identified literature grouped by the different literature streams. All in all, fifty contributions contain concrete or deducted data principles for customer data. Another paper (Culnan 2019) compares the previously identified principles and is therefore not explicitly listed.

Table 3. Literature Streams and Identified Relevant Literature

Stream	**References**
Legal Institutional Frameworks & Management Frameworks	(1) AICPA 2020; (2) Code of Conduct of the Data and Marketing Association 2020; (3) European Commission 2022; (4) Federal Trade Commission 2012; (5) GDPR 2023; (6) Gellmann 2017; (7) Langford 2022; (8) ISO 2019; (9) OECD 2022; (10) Sitra 2021; (11) The White House Report 2012; (12) TrustArc-Nymity 2020 (13) LGPD Brazil 2023; (14) CCPA 2023.
AI Governance	(15) European Commission 2019; (16) IEEE 2022
CRM, IS & Service Literature	(17) Bose 2022; (18) Cavoukian 2009; (19) Cespedes and Smith 1997; (20) Chan 2005; (21) Cunningham et al. 2004; (22) Fan and Poole 2006; (23) Fellenz and Brady 2010; (24) Fischer et al. 2018; (25) Gebert et al. 2003; (26) Raj et al. 2018; (27) Häikiö et al. 2020; (28) Jayachandran et al. 2005; (29) Kumar et al. 2013; (30) Kumar and Reinartz 2006; (31) Lehrer et al. 2018; (32) Neslin et al. 2006; (33) Pan and Lee 2003; (34) Payne et al. 2015; (35) Payne and Frow 2005; (36) Park and Kim 2003; (37) Ranjan

Stream	References
	et al. 2009; (38) Rowley 2002; (39) Stone et al. 2004; (40)Vesanen 2007; (41) Wulf 2020; (42) Xu and Walton 2005
PIMS & Personal Informatics	(43) Cena et al. 2018; (44) Crabtree and Mortier 2015; (45) Crabtree et al. 2018; (46) Li et al. 2010; (47) Mortier et al. 2014; (48) Poikola et al. 2020; (49) Rapp and Cena 2016; (50) Rooksby et al. 2014

Table 4. Identified Data Principles and Respective Literature

Legal-orientated Data Principles	
Privacy by Design	2, 4, 5, 12, 15, 16
Accuracy & Quality	1, 2, 5, 6, 9, 12, 13, 15, 19, 34
Information Transparency	1, 2, 3, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 34
Purpose Specification/ Limitation	1, 5, 6, 9, 11, 12, 13, 34
Minimization of Data Collection & Storage Limitation	1, 2, 5, 6, 9, 11,12, 13, 14
Access of Customer Data	1, 3, 4, 5, 6, 9, 11, 12, 13, 14, 34
Restriction, Rectification and Deletion	1, 5, 9, 12, 13, 14, 34
Consent Management	1, 4, 5, 9,12, 13, 14, 19, 34
End-to-End Security	1, 2, 5, 6, 8, 9, 11,12, 13, 14, 15, 34
Legal Authorization and Accountability	2, 5, 6, 9, 11,12,13,14, 15, 34
Responsible Exchange with Service Partners	1, 2, 9, 12,13, 17, 24
Data Portability	3, 5, 7, 12 13, 43, 48
Business-orientated Data Principles	
Single View of the Customer	17, 20, 22, 23, 28, 33, 35
Meta-Data Management	12, 39
Company-wide integrated Data Access	17, 24, 25, 28, 32, 33, 38, 41
Analytical Capabilities for Customer Intelligence	20, 21; 23, 35, 41, 42
Personalization of Customer Interaction	22, 31, 33, 40, 42
Real-time Capabilities	24, 26, 37
Performance Assessment for Decision-Making	20, 30, 31, 35
Customer-orientated Data Principles	
Customer Feedback Loops	28, 36
Customer Control & Self-Management of Data	7, 10, 11, 15, 16, 44, 45, 47, 48, 49
Multi-operator Identity and Consent Management	16, 47, 48
Multi-operator Interoperability	10, 48
Traceability and Legibility	10, 27, 43, 44, 47, 49
Customer Value and Personal Analytics for Improving Life Value	2, 15, 16, 28, 37, 43, 46, 49, 50

Legal-orientated data principles can be identified in a variety of legal and institutional frameworks, guidelines, and regulations, but also in management frameworks or in marketing, IS or CRM literature (e.g., Payne et al. 2015; Trustarc 2021; Data and Marketing Association 2022). These data principles represent regulatory necessities and policy guidelines and originate from a set of self-regulatory programs that formed early privacy policies, e.g., the Code of Fair Information Practices (Culnan 2019; Gellman 2017). In Europe, the General Data Protection Regulation, GDPR) forms the legal ground for processing customer data. Other countries have recently institutionalized similar policies, such as the California Privacy Rights Act, the Virginia's Consumer Data Protection Act or the Brazilian General Data Protection Law (Erickson 2018). Even if the principles slightly differ in their wording, they are built upon central requirements, such as privacy by design, security, consent management, the need for accuracy and data quality, and transparency. Another central element is the customer's right to access their data just as the right for restriction, rectification, or deletion of their data. AI governance frameworks, such as the Ethics Guidelines for Trustworthy AI (European Commission 2019) emphasize another layer of transparency, i.e., the need to explain certain results of algorithms and AI models. Furthermore, other core legal principles are authorization and accountability for the right data usage, the purpose specification of data or the collection and storage limitation principle. Moreover, the necessity for responsible data exchange with service partners is highlighted (e.g., GDRP 2023; AICPA 2020). Finally, data portability signifies the customer's right for data transmission from one organization to another (GDPR 2023; European Commission 2022). Besides legal regulatory requirements, data principles are also grounded on business requests. These *business-orientated data principles* can be mainly found in the CRM and service management literature that demand customer-centric information management for a successful application of customer data (Fellenz and Brady; Bose 2002; Chan 2005). One core requirement is the integration of all data sources into one single unified view (Payne and Frow 2005). This requires the integration of all interactions with customers and the resulting data across touchpoints (Payne and Frow 2005; Jayachandran et al. 2005). For this purpose, meta-data and master-data management are important to create a common understanding and semantic definitions of data models, types and repositories of customer data as a prerequisite of data integration (Stone et al. 2004; 2017; Dyché and Levy 2006). In addition, data governance practices should address the organisation's integrated data access for customer management. For this purpose, front-office and back-office applications must be linked (Bose 2002; Pan and Lee 2003), and an easy access to updated and integrated information of the customer must be available for relevant employees (Bose 2002; Jayachandran et al. 2005; Stone et al. 2017) just as an integrated knowledge management for a consistent customer experience (Wulf 2020; Neslin et al. 2006; Rowley 2002). Besides this, an encompassing governance approach must ensure analytical capabilities to generate customer intelligence, e.g., via descriptive, prescriptive or predictive modeling (Payne and Frow 2005; Chan 2005). Analytical capabilities are often interlinked with the principle of personalization which is grounded on accurate user profiling and segmentation functions (Xu and Walton 2005; Bose 2002). Customer data management must be set up in a way to achieve personal service offerings on an individual or segment level (Pan and Lee 2003;

Fan and Poole 2006). Activities must allow trigger- and preference-based personalization just as automatic and human-based personalization when employees are involved (Lehrer et al. 2018). Two other core requirements are real-time capabilities and performance assessment. Principles must not only cover the development of performance metrics for strategic and tactical decision-making (Chan 2005; Kumar et al. 2013), several researchers also emphasize the need of real-time customer insights (Fischer et al. 2018; Ranjan and Bhatnagar 2009; Raj et al. 2018).

In contrast, *customer-orientated data principles* put the customer into the foreground. They underline the active role of the customer and the necessity to develop human-centered approaches of good data practices (Poikola et al. 2020). The principles are mainly anchored in the literature streams of PIMS and personal informatics, but also in the CRM literature. One central data principle is the consideration of customer feedback loops (Park and Kim 2003). Practices around customer data should allow the systematic collection, processing, and use of the customer's voice providing feedback to an organization. This requires processes for information reciprocity so that organizations can directly respond to the customer's feedback (Jayachandran et al. 2005). Research around PIMS strengthens the principles of data agency, human-centric control and self-management of customer data (e.g., Poikola et al. 2020; Mortier et al. 2014). Similarly, defined guidelines around AI governance (IEEE 2022; European Commission 2019) incorporate the aspects of control and agency. Closely involved are principles such as multi-operator identity and consent management . Customers must be able to manage multiple identities and even more important multiple consents for data usage across organizations and services (Poikola et al. 2020; IEEE 2022). Another related principle is the legibility of customer data processes. This includes transparency related to data processing, data visualizations, or the methods used for algorithms and related decisions (Mortier et al. 2014; Sitra 2021). Data presentation and visualization must help customers to make sense of their data and can incorporate a way of user-understandable data logging and auditing (Crabtree and Mortier 2015), or simple and engaging reports or suggestions (Rapp and Cena 2016; Häikiö et al. 2020). Moreover, the principle of interoperability across operators and organizations become more and more important (Langford et al. 2022; Sitra 2021). When customers are able to exchange their data between services and organizations, organizational, semantic, and technical interoperability are necessary (Langford et al. 2022). Finally, data governance practices should aim to add value to the customer and improve their wellbeing. This can range from improving understanding of the customer's needs and actions, to develop customer -specific products and services (Jayachandran et al. 2005), to improve the customer's life (Rooksby et al. 2014; European Commission 2019). For example, personal informatics support customers to "collect personally relevant information for the purpose of self-reflection and gaining self-knowledge" (Li et al. 2010, p. 558) and can include goal-driven, or diagnostic tracking (Rooksby et al. 2014).

4.2 Relevance of Data Principles in Practice

The interviews confirmed a practical relevance of the principles and several drivers and challenges for implementation. Some of the legal principles, such data quality, consent

management, end-to-end security and legal authorization and accountability are assessed as critical for daily operations. Enablers to incorporate them into daily practices are customer expectations, but also guaranteeing process assurance, efficiency and competitive advantages. When specifically asking the experts about *customer-orientated principles*, the interviews demonstrate that data governance is still mainly organizational-driven and that these principles have not yet arrived in organizations. Even if the experts generally assess these principles as more important than currently operationalized in organizations, they still play a minor role due to missing organizational awareness. Similarly, the importance of data portability is generally rated as low by the experts. They remark that the relevance highly depends on the industry and the business model. In some areas, such as healthcare, insurances or banking, some respondents note a higher significance, but the low demand on customer side results in a low awareness for the organizations. Likewise, the principles of control and self-management just as traceability and legibility have a generally low relevance in organizations. Even if the experts see a positive value for customers, they remark the need for high transparency of all internal and external processes on the organization side to implement these guidelines. Moreover, the experts critically mention that not many customers currently demand functionalities related to the self-management of data so that organizations must weigh up whether the implementation is worthwhile. Other challenges are the technical complexity, but also related data security and privacy isssues, e.g., a secure customer identification for data access. In respect to the principle of data portability, some experts see external service providers as responsible for ensuring data portability for the customer rather than the organization itself. Multi-operator identity management plays, for example, a higher role in e-commerce, especially with the rise of federated identity solutions (Ehrlich et al. 2021), such as Facebook or Google Connect. Interviewees remark that organizations should collaborate with neutral solution providers for identity management that should not base their business model on the commercialization of customer data. Finally, the principles of customer value and personal analytics is perceived as important. Experts see the chance for organizations to improve customer-related processes and to develop competitive advantages focusing on customer value. Similarly, data standards represent an important driver to ensure interoperability and data portability. The experts see the potential for creating trust and value for customers and to meet customer expectations in the appropriate handling with their data. Yet, they also mention the need for internal data understanding and transparency and the organizational awareness for *customer-orientated principles*.

5 A Conceptual Framework of Data Principles for data-driven Service Innovation

Based on the identified principles from LR and interviews, this research suggests a first conceptual framework of data principles for data-driven service innovation. By incorporating data principles into data-driven service innovation, organizations can ensure the responsible and effective use of data, while building trust and delivering value to their customers. Data principles can thereby support in the actual service concept design

and implementation just as the actual management of new data-driven services (cf. Beverungen et al. 2018). For example, they assist in the design of information collection, distribution and delivery just as relevant workflow processes and responsibilities for data-driven service implementation (Khatri and Brown, 2010; Rizk et al. 2018; Lim et al. 2018). The proposed framework presented in Figure 1 systematizes the presented data principles along the dimension of customer centricity. The customer has become the creator and a recipient of information so that customer-centered data governance approaches focusing on customer value and the self-management of customer data should receive more attention (Becerril 2018; Koskinen et al. 2019; Tapsell et al. 2018). However, the interviews revealed that the relevance of *customer-orientated principles* highly depends on the organizational awareness and the maturity of the organization. This work follows the *Customer Dominant Logic* (Heinonen and Strandvik 2020) and conceives the customer as the overall data subject, still considering that a customer can represent different roles, such as a citizen, a user, or a client (Heinonen and Strandvik 2018). Thus, the framework underlines the need for legal guidance, but goes further and highlights the development towards strong *customer-orientated principles* for the design and management of data-driven services. The framework suggests starting with the implementation of *legal-orientated principles* as a basis when developing data-driven services, but to gradually expand activities to include *business and customer-orientated* principles. Where as the application of *legal-orientated principles* are mostly forced by law, organizations can gradually take advantage of *business and customer-orientated* data principles to increase the level of customer centricity. By following more and more *customer-orientated* principles, new types of services can be designed that allow the self-management and control of customer data.

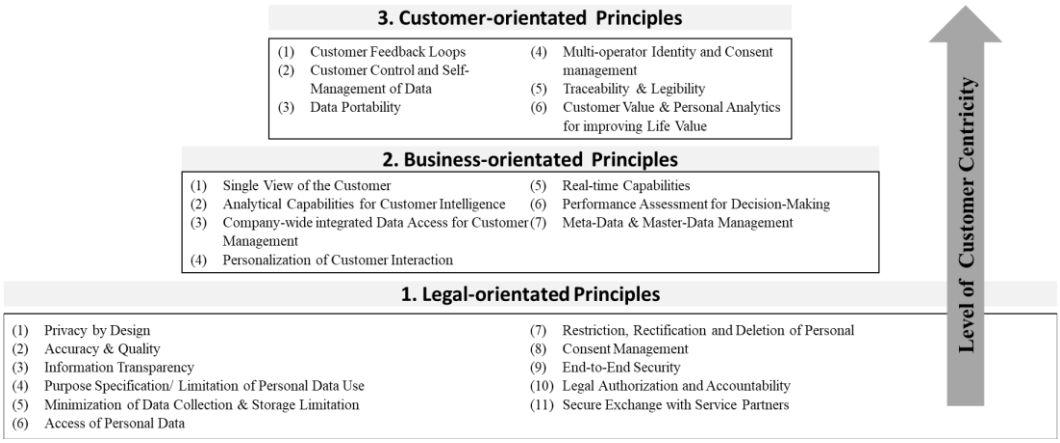

Figure 1. Framework of Data Principles in Data-driven Service Innovation

6 Summary and Research Contribution

This paper extracts and categorizes several data principles for managing customer data for data-driven service innovation. For this purpose, it outlines the analysis of different

research streams and discusses the resulting perspectives *of legal-, business- and customer-orientated* data principles with experts. Simarly to other researchers (Kühne and Böhmann, 2018; Sammon and Nagle, 2017), this research points toward the need for integrating data governance into the design of new services from the outset, rather than building procedures only as a part of operational activities. The results of this research provide practical and theoretical contributions. First, it adds value to the service innovation research stream by systematically incorporating data principles through the analysis of different academic streams. Second, practical knowledge is gathered regarding the implementation of the identified principles and the related maturity level. Third, existing data governance approaches are extended with a strong customer focus instead of a primary organizational perspective. Finally, practical guidance for taking advantage from the identified principles is provided as a toolbox for service providers. The presented framework proposes to increase the level of customer centricity by building up the management of customer data for data-driven services upon *legal-, business, and customer-orientated* data principles. Integrating data principles into the service innovation process has several potential benefits. First, it ensures compliance with regulatory requirements throughout the service innovation process, taking into account important guidelines as early as the conception of new services. Second, the gradual application of business and *customer-orientated principles* not only ensures the integration of business requirements, it allows the discourse for novel perspectives that strengthen personal data sovereignty of the customer in human-centered approaches of data-driven service innovation (Nomura et al. 2020; Koskinen et al. 2019).

Yet, this research has several limitations. Even if the first research results offer valuable knowledge for the design of a first conceptual framework, subsequent evaluation is required that actually demonstrate the usability and feasibility of the conceptual model when designing new data-driven services. This evaluation should occur in different industries or application fields to reach more confident and rigorous justification and generalization (Vom Brocke et al. 2020). The conceptual framework represents early conceptual knowledge to support organizations in the design of data-driven services. Further development must be discussed if the model can be further refined, e.g, in the form of design principles or certain process models (Gregor and Hevner 2013). Moreover, the conducted interviews can only offer first tendencies related to the relevance of the discussed principles. The analysis of the interviews already demonstrates several differences in the perceived relevance and implementation depending on the industry, size of the organization, and their maturity level. Accordingly, a more comprehensive survey is necessary to assess the current relevance of the principles in more detail. Finally, ethical guidelines representing values such as avoiding discrimination, ensuring human rights or fairness (Balasubramaniam et al. 2022; IEEE 2022) need to be more strongly integrated. While this contribution focused more on data principles for technical implementation, further research should also consider the relevance of ethical principles for data-driven service innovation, such as fairness or discrimination.

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