Preparation is Everything – Organizational Readiness Factors for Acting in Data Ecosystems

Tim Brée, Marvin Jagals and Erik Karger

Abstract: Data are the foundation of the digital economy, but various challenges regarding managing data assets still exist. One approach to solving these challenges is applying the data-sharing economy principles. Many companies are, however, unsure of the factors that need to be developed to enter a data ecosystem successfully with other, partially competing organizations. Based on qualitative data gathered from an interview study, this research paper applies a framework for organizational readiness factors to data ecosystems. Legal foundation, top management support, and stakeholder involvement in data ecosystems are the main factors highlighted by the study. Furthermore, our empirical results confirmed our preliminary findings from a structured literature review and extend the given research framework.

Keywords: data ecosystems, data sharing, organizational readiness, organizational research, data

Vorbereitung ist Alles – Organisatorische Bereitschaftsfaktoren für das Agieren in Datenökosystemen

Zusammenfassung: Daten sind die Grundlage der digitalen Wirtschaft. Allerdings gibt es immer noch verschiedene Herausforderungen, Daten als Vermögenswert zu managen. Eine Lösung davon ist die Anwendung von Prinzipien der Data Sharing Economy. Viele Unternehmen sind unsicher, welche Faktoren entwickelt werden müssen, um erfolgreich in ein Datenökosystem mit anderen, teilweise konkurrierenden Organisationen einzutreten. Auf der Grundlage von qualitativen Daten, die im Rahmen einer Interviewstudie gesammelt wurden, erforschen wir organisatorische Bereitschaftsfaktoren für Datenökosysteme. Die rechtlichen Grundlagen, die Unterstützung durch das Topmanagement und die Einbeziehung der Stakeholder in DEs sind die am häufigsten genannten Faktoren. Außerdem bestätigen unsere empirischen Ergebnisse die Erkenntnisse aus unserer Literaturrecherche und erweitern den vorgegebenen Forschungsrahmen.

Stichwörter: Datenökosysteme, Datenaustausch, Organisatorische Bereitschaft, Organisationsforschung, Daten

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1. Introduction

Companies must constantly innovate to succeed in an environment marked by rapid change. Based on the premise that a fundamental transformation of organizations is urgently needed, companies are increasingly using networks to expand the possibilities for cooperation to accelerate innovation processes (Rasch & Hain, 2017). Practitioners and researchers emphasize that one of the primary reasons for the growth of inter-organizational cooperation is its ability to enable organizations to share goods, expertise, talents, and experience from a diverse set of inter-organizational stakeholders to solve a variety of challenges and contribute to the creation of business value (Gray & Stites, 2013).

Consequently, many organizations have started to organize themselves into business ecosystems. The business ecosystem concept refers to an economic environment sustained by a foundation of interdependent institutions and individuals, including consumers, producers, rivals, and other stakeholders (Moore, 1993). Organizations participating in business ecosystems recognize the importance of bundling mechanisms during, for example, product development to gain specific competencies and capabilities that work to the firm's advantage (Tan et al., 2020).

Simultaneously, the amount of data produced and exchanged over recent years rapidly increased (Barnaghi et al., 2013). For many companies, data have become an important asset. Due to the increased importance of data, organizations try to take advantage of this, which can result in a new formation known as data ecosystems (DEs) (Oliveira et al., 2019). A DE comprises intricate networks of entities and individuals who share data with other actors (Zuiderwijk et al., 2014). Organizing and categorizing DEs effectively will ultimately deliver more performance to ecosystems' participants, for example, by improving data quality of common market data through information sharing (Oliveira et al., 2019).

Many companies, however, currently do not operate in DEs. One reason is that manifold barriers inhibit organizations from easily entering those environments. These entry barriers can have, for example, an organizational, technical, or legal nature, such as required memberships or multi-lateral contracts (Janssen et al., 2012). Data disposal is also a significant challenge for organizations. Moreover, capabilities that enable adaptability and flexibility, in general, are critical since there are always uncertainties within inter-organizational formations, which means that being prepared for this context becomes increasingly important (Greenberg et al., 2016).

Initial studies already focused on different aspects of DEs, for example, data governance or taxonomies (Immonen et al., 2018; Oliveira et al., 2019). Today, research on the prerequisites that companies or organizations must have to participate successfully in DEs is scarce. One way to measure these aspects is the investigation of organizational readiness factors (ORFs), describing whether the organization is willing and able to conduct a change to improve its effectiveness. Research on this topic is urgently needed and can benefit organizations and management practice. Given the high relevance of data and the numerous benefits joining a DE can have for organizations, the high number of companies not participating in a DE is surprising. We see a major reason for this in the lack of knowledge about the necessary requirements for joining a DE. To the best of our knowledge, research has not yet investigated the organizational preconditions that are relevant for companies to join a DE. We aim to close this gap by identifying relevant readiness factors for participating actively in DEs. This research objective leads us to the following

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research question: *"What are organizational readiness factors for joining and participating in a data ecosystem?"*

Aziz and Yusof's (2012) concept of ORFs serves as a research framework. First, we conduct a structured literature review (SLR). As a second step, we extend the review with exploratory and qualitative data collection in semi-structured interviews with selected participants in key positions within DEs. We aim to ensure an in-depth analysis to shed light on the ORFs. It is important to be prepared to join a DE without being disillusioned about what organizations can or should expect during their ecosystem journey. We also discuss the presented results, considering the present DE research, and smooth the path for further investigations. Notes regarding this paper's limitations, as well as concluding remarks, finalize this contribution.

2. Related Work

2.1 Data Ecosystems

Due to increasing production and consumption, data have become a valuable and tradable good. As a result, DEs have emerged in which actors exchange, produce, or consume data (Oliveira & Lóscio, 2018). DEs are inspired by different prior concepts, first by the notion of biological ecosystems (Chapin et al., 2011) but also by the ideas of business ecosystems, digital ecosystems, and software ecosystems (Oliveira & Lóscio, 2018). One of the most used analogies within ecosystem research was coined by Moore's (1993) concept of business ecosystems. He understands a business ecosystem as an economic community of interacting organizations, including producers, suppliers, competitors, and stakeholders. Later, the ecosystem concept was applied to other research areas, for example, platform ecosystems (Tiwana et al., 2010).

In recent years, the concept of data ecosystems has become established in research. The numerous understandings have in common that they describe socio-technical complex networks in which actors interact and collaborate not only to find, archive, publish, consume, or reuse data but also to foster innovation, create value, and support new businesses (Oliveira et al., 2019).

The rise of DEs has been driven by several factors, including the emergence of digital technologies and political or institutional initiatives. Based on the increased amount of produced, used, and stored data during the last years, this concept became the focus of research and practice. The participants in a DE are assigned to different roles in the concept, which are loosely connected (Oliveira et al., 2019). In the configuration of data ecosystems, allocating decision rights and accountabilities to encourage desirable behavior over intangible assets becomes more uncertain (Winkler & Wessel, 2018). Nevertheless, participation in a DE has several benefits and advantages for organizations, like better data-based processes and enhanced communication and interaction with stakeholders.

2.2 Organizational Readiness Factors

Regarding adoption antecedents, studies from various disciplines examine the idea of organizational readiness for companies' transformation (Weiner, 2009). In essence, readiness is required to engage in a certain action, such as implementing a particular invention. Business research identifies a variety of characteristics that affect an organization's readiness to embrace new technologies. The readiness characteristics can, for instance, include

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managerial support, organizational culture, mission coordination, or willingness to cooperate (Lokuge et al., 2019).

Historically, readiness models have been criticized for various reasons. For instance, readiness models and associated outcomes often exhibit bias due to organizations' self-assessments. Nonetheless, readiness is necessary for an operational capacity associated with active technology implementation, and organizations fear failure if they are not prepared for adoption. Generally, change management researchers assert that greater readiness leads to more successful change implementation – social cognitive theory and motivational theory support this hypothesis (Kotter, 2010; Weiner, 2009).

For the remainder of this article, we differentiate between three different terms and concepts: Change management, organizational readiness, and organizational readiness factors. First, change management is *"the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing needs of external and internal customers"* (Moran & Brightman, 2001, p. 111). Therefore, change management can be seen as the process leading to controlled organizational change. Because change management is there to initiate and accompany change in organizations, it can help achieve the state of organizational readiness for a certain event, like implementing a technology. Therefore, organizational change sets the grounding for organizational readiness (Lewin, 1951). The readiness for change is achieved when certain organizational readiness factors are met. This means the readiness for change is a set of organizational readiness factors. Figure 1 illustrates our understanding of these three key terms.

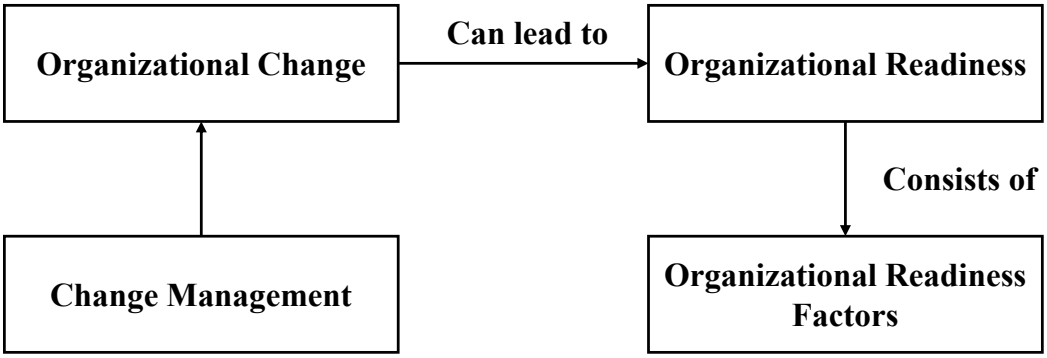

Figure 1. Different key terms and their relationships

The article does not focus on change management or organizational change processes. Instead, we aim to investigate what organizational readiness factors determine the organizational readiness of an organization to join a data ecosystem.

3. Research Framework

Aziz and Yusof (2012) have systematized the different readiness factors and designed a readiness model, which we now use as a basis for our research. Based on the given research framework, we collect existing data from business and related literature and qualitative data through interviews with experts in the given research field to draw up a holistic organizational readiness framework for participating in data ecosystems.

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Based on an initial contribution of Paré et al. (2011), five dimensions were identified as possibly related to organizational readiness: the attributes of change that are being introduced, the extent of leadership support for the proposed change, the internal context in which the change took place, the attributes of the change targets, and the information technology (IT) support (Figure 1).

The *attributes of change* refer to change is required as a key sentiment to creating change readiness (Armenakis et al., 2007). Within the first construct, vision clarity will justify the change. Change appropriateness concerns individuals who may think a certain form of change is needed but who disagree with the proposed change. The change efficacy is the organizational member's confidence to use the system and their belief that the change will be successful (Paré et al., 2011).

The *leadership support* describes top management and local change agents (Armenakis et al., 2007). Practitioners and academics recognize that it is difficult to undergo complex change within that domain without an effective project champion (Paré et al., 2011).

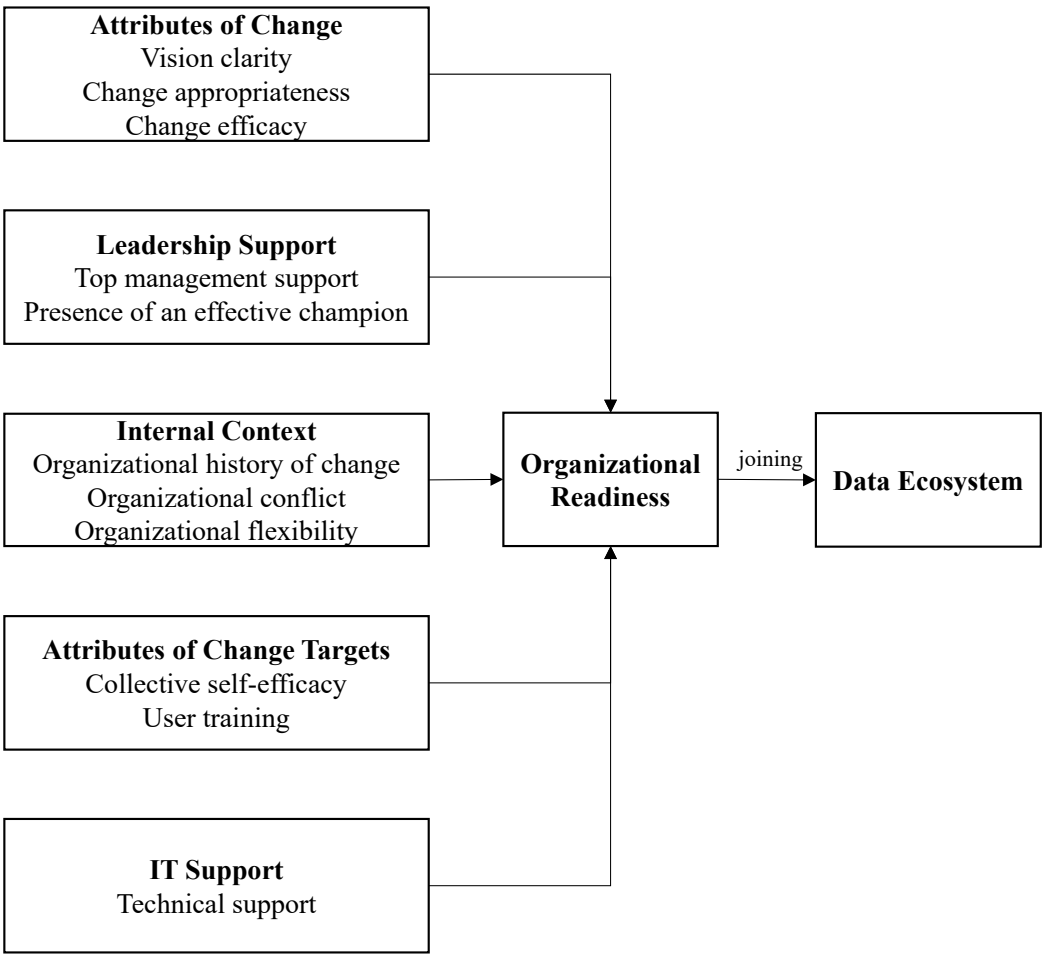

Figure 2: Research framework, based on Aziz and Yusof (2012)

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Furthermore, researchers and change management practitioners have discussed the *internal context* conditions that affect organizational readiness (Weiner, 2009). The organizational history of change might affect how a change is framed and might influence IT implementation success. Organizational conflicts might lead to perceptions among the organizational members that the organization is not ready for a change (Paré et al., 2011). Organizational flexibility will improve organizational performance since flexible organizations can adapt to rapidly changing environments.

The *attributes of the change targets* refer to the organizational members that require a change. Paré et al. (2011) identified collective self-efficacy as a driving factor for organizational readiness in this context. When organizational members share a common, favorable assessment of, for example, task demands, they share a sense of confidence that enables them to collectively implement a complex organizational change resulting in change efficacy (Weiner, 2009).

The provision of adequate *IT support* can help improve user understanding and application skills. A lack of technical support results in unsuccessful implementation and development projects, including increased delays and frustrations of users.

4. Method

Our research goal is to investigate which organizational readiness factors are relevant for participating in DEs. To answer our research question, we conducted a twofold research approach, including a systematic literature review and expert interviews to extend the literature review results. Thereby, the interview study was carried out following the SLR. The results from both steps led us to our research result (see fig. 3)

Figure 3: Overview about the research process

4.1 Literature Review

We conducted a structured literature review to identify all relevant literature dealing with ORFs in DEs. For conducting the review, we followed the guidelines of Kitchenham and Charters (2007). These guidelines are well known because of their clear structure and have already been used for many literature analyses throughout many different disciplines.

For the initial search, we used the following databases: AIS Electronic Library, EBSCOhost, Emerald Insight, IEEE Xplore, ProQuest, ScienceDirect, Scopus, SpringerLink, Web of Science, and Wiley Online Library. We chose them because they contain the most conferences and journals of economics and related fields. We applied the following search string that was developed from the defined research question and the underlying research framework:

("data ecosystem" OR ("ecosystem of data")) AND ("organizational readiness" OR "organisational readiness" OR "attributes of change" OR "leadership support" OR "internal context" OR "attributes of change targets" OR "IT Support")

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Due to this paper's focus, this search string consists of the terms "data ecosystem" or "ecosystem of data." Based on the chosen framework of ORF, we searched for the five different dimensions of ORFs in our search string. Furthermore, to identify ORFs that are not part of the underlying framework, we searched for the more general terms "organizational readiness" and "organisational readiness".

Based on the approach of Karger (2020), we structured our literature review in four steps (see Fig. 4) to select the relevant publications for answering our research question.

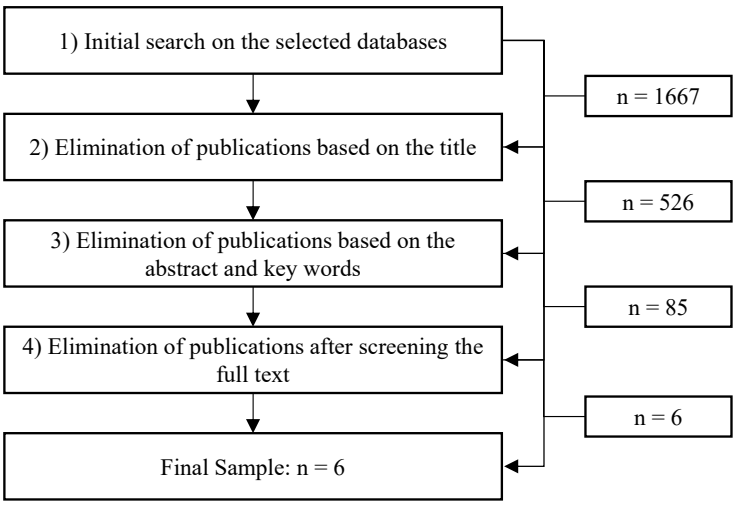

Figure 4: Overview of the elimination process during the SLR

The initial search of the SLR was conducted, and the initial search led to a total sample of 1,667 publications. By reading the title of each publication, we eliminated the papers who do not refer to an IS or related field in the context of ecosystems. In the next step, we read the abstracts and keywords of the retained publications. These steps led to a decreased sample of 85 publications. Finally, we screened the remaining publications' full text to identify the final sample of publications that fit our scope and contain information about ORFs in DE. Thereby we investigated the research papers, if they name and describe one of the five dimensions or single factors of these. Overall, six publications described ORFs for DEs.

4.2 Interview Study

Due to the limited results of the SLR, we conducted an interview study to gain knowledge and practical insights about ORFs from experts in the DE area. Many different forms and types of interviews exist, and one can generally differentiate between structured, semi-structured, and unstructured interviews (Leavy, 2014). In this study, we used semi-structured interviews to develop an in-depth understanding of ORFs for DEs. We designed an interview guide that was derived from the preliminary results of the conducted SLR and the dimensions of the underlying framework. The goal was to cover all ORF dimensions and to get an expert's evaluation of their relevance as ORFs for DEs.

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The developed guidelines served as a rough orientation. We asked several follow-up questions and actively encouraged the interviewees to share as much information as they wanted and mention things they deemed relevant. For data analysis, we have oriented ourselves to the approach of Kendall et al. (2020). The interviews were transcribed into written records. The written records were accessible to all participating researchers and were analyzed separately by two authors. Therefore, we used the software MAXQDA. Within the interview study, 15 semi-structured interviews with DE experts were conducted in a virtual setting. Fourteen interviewees work for European companies and institutes, and one is in Malaysia. The following table gives an overview of the different interview partners including their experience with DE, their perspective on the DE, and the interview duration.

ID	Age	Gender	Position	Experience with DE	Perspective on the DE	Interview duration
IP01	41	Male	Managing Director	Two years	Practice	26:10
IP02	39	Male	Group Manager	Six years	Research	44:38
IP03	47	Male	Managing Director	15 years	Consulting	38:48
IP04	38	Male	Scientific Adviser	One year	Research	54:38
IP05	24	Female	Research Assistant	Three years	Research	31:27
IP06	31	Female	Project Manager	Two years	Practice	30:38
IP07	46	Female	Solution Manager	14 years	Consulting	34:09
IP08	45	Male	Managing Director	15 years	Research	26:50
IP09	54	Male	Chief Executive Officer	25 years	Consulting	35:01
IP10	61	Female	Co-CEO	30 years	Practice	37:53
IP11	42	Female	Managing Director	Six years	Practice	33:34
IP12	30	Male	Research Assistant	Four years	Research	28:28
IP13	38	Male	Product Owner	1.5 years	Consulting	35:02
IP14	47	Male	Vice President	10 years	Practice	31:43
IP15	46	Male	Group Manager	10 years	Research	33:05

Table 1: List of interview partners

Based on the perspective of a DE, the interviewees can be sorted into three groups: Five interviewees were practitioners who work actively in a DE. Second, four interviews are summarized due to the interviewees having a consultant perspective on a DE. Finally, six interviewees have a research background and work actively in existing DEs or DE initiatives. By conducting interviews with practitioners, consultants, and researchers, we aimed to get a comprehensive and multi-perspective view of the phenomenon of DEs and the associated ORFs.

The interviews' main part about the ORF framework in DEs was recorded and evaluated afterward. This part lasted between 18 and 36 minutes and contained six different questions about the different dimensions of ORFs. Furthermore, it included an open part about ORFs that were not initially part of the dimensions in the understanding of the interviewees. These last questions were important to identify additional factors.

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Based on the transcripts, the statements of the interviewees about the ORFs were coded by a supported software tool to get an overview of the different factors based on the questions where the statement was made. Second, the statements were analyzed in detail and reallocated to the right dimension if needed.

5. Results

Based on the SLR and the conducted interviews, we identified necessary factors of the ORF framework and added certain factors that were additionally named. The following figure gives an overview of the identified factors.

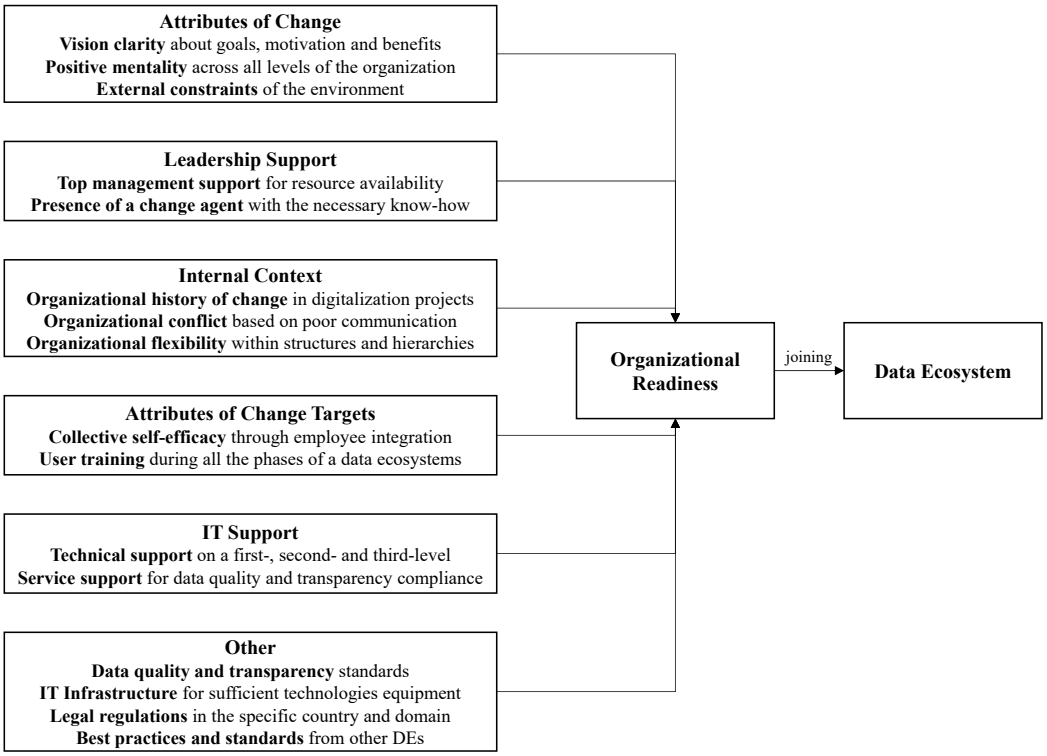

Figure 5: Overview of identified ORF for DEs

5.1 Literature Review

Based on the structured literature review, we identified six publications about ORFs and DEs. The literature on this topic is still recent. Five papers were published earliest in 2018 and one in 2014. We found at least one research paper on each dimension. Thereby, the dimension of internal context appears most often in the papers.

The dimension of *attributes of changes* focuses on vision clarity. An isolated vision and strategy for open data lead to challenges and a lack of broad support in these terms (Enders et al., 2020). For clarity about benefits, a data vision should be embedded into a broader strategy. Furthermore, a shared vision characterizes the environment of data initiatives (Gupta et al., 2020).

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Leadership support involves senior and middle-level management (Enders et al., 2020). The senior management helps embed the mindset in the company's vision and strategy. The middle management's task is to convince the employees of the open data activities' benefits. A leader helps by creating and communicating the vision and required changes (Gemignani et al., 2014). Altogether, set and communicate the expectations of using data in the organization.

The factors of organizational history of change and organizational flexibility within the *internal context* are named in the literature. One example that highlights the importance of an organization's history of change is the introduction of big data systems. It created a negative feeling among users because they were often neglected, resulting in the feeling of increased workload (Shin, 2016). As organizational silos impede change in an organization, cross-functional teams can be used to minimize organizational conflict (Enders et al., 2020). They support an exchange of ideas and collaboration within the innovation process. The employees need enough resources to implement the changes which is often a challenge in organizations. For data-driven solutions, ecosystems need high flexibility to conform to them (Munoz-Arcentales et al., 2019).

The *attributes of change targets* include skills within the organization that are therefore needed for implementation (Enders et al., 2020). Also, employees need ongoing training and support to help the organization achieve its goal (Gemignani et al., 2014).

IT support is recommended for data development or digital services development (Immonen et al., 2018). They focused on six different quality-related support service activities supporting and ensuring the quality of the services. These activities include, e.g., the definition of open data sources, the extraction of data from the different data sources, and the quality certification of these services.

5.2 Interview Study

5.2.1 Attributes of Changes

The interviewees confirmed the need for a clear vision for participating in a DE. From a practical perspective, the vision focuses on the changes in the future due to the increasing digitalization and the desire to create the future (IP06). The benefits, such as the know-how development and access to resources, must be clear to the participants (IP11). Moreover, practitioners mentioned the factor of external constraints like demographic changes or a legislation (IP06).

From a consulting perspective, a transparent communication about the reasons and benefits of the vision is important (IP03). It can be done by emphasizing used cases and creating awareness that data is a tool (IP09). The consultants see also the pressure through external constraints, like the need to switch to a home office (IP07) and through the further development of competitors (IP13).

The interviewed researchers also see the need to develop a vision including the long-term future and intrinsic motivation (IP02). The resulting long-term benefits of participating in a DE must be known and be communicated transparently within the company (IP12). Intrinsic motivation can be created by showing the need for change and the potential of the DE (IP04), and by offering incentives to motivate the employees (IP15). Moreover, the organization's mentality, shaped by best practices (operative level) and economic benefits (management level), concerning digitization must align (IP05). Organi-

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zations must work at changing themselves despite cost constraints and external constraints (e.g., competitors' possible innovation, pandemic) (IP02, IP15).

5.2.2 Leadership Support

Local change agents and top management support are important factors.

> "The participation in a DE is so sensitive that it cannot operate as a submarine via a change agent alone. It must come from the top (chief information officer (CIO) / chief digital officer (CDO))" (IP15).

The willingness of active participation of the responsible top management is necessary to participate in a DE (IP01). Furthermore, they must provide the necessary resources, like budget time and power (IP14). The presence of an effective champion is necessary, too. This is a person actively working with the DE that has the required knowledge (IP01). It can be a change agent who is able to implement the DE in the organization (IP14).

The interviewees from consultancies emphasize the active participation of the top management (IP09). It includes leading (IP13), mindset (IP07), and consequently behavior (IP03). They also confirm that the operational management could reside with a local change agent. This agent should have knowledge about data and data protection (IP07) and the backing from the management (IP03) to which he must report (IP07).

The interviewed researchers highlighted the importance of top management support. Top management should have the sensitivity and commitment to the successful participation in a DE (IP04) and the responsibility for creating incentives for the employees and for setting environmental conditions (IP05). The supervision of an effective DE project should belong to the CDO or CIO (IP08). The CDO/CIO promotes and supports the change through a mandate on the operational level (IP12). On this level a change agent can be installed who is responsible for the DE across all departments (IP05) and regularly report to the management about the progress (IP08). Leadership support depends on an organization's size and structure (IP04).

5.2.3 Internal Context

The interviewed practitioners mention certain advantages of companies who did some projects around data and have employees with the experience and knowhow about DE and data sharing (IP06). Unexperienced organizations can be overstrained in a DE due to the amount of existing data (IP11). Considering the factor of organizational conflicts, it is necessary to communicate (IP10). To provide data, flexible organizational structures are needed (IP06). These are to be knowledge-based to react faster to changing requirements (IP11).

The interviewed consultants highlighted the factors of organizational history and organizational flexibility. They see differences between organizations with and without knowledge in digital change or data science (IP03, IP13). It may also become necessary to break down departmental boundaries into end-to-end processes, which makes it easier to work across departments (IP09). Flatter hierarchies can help with structural changes because teams come together more quickly and have more intrinsic motivation (IP13). While IP03 considers more flexibility and agility as necessary because of a higher speed of changes, IP07 believes flexibility leads to disadvantages because too much flexibility and

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agility hinder compliance with standards. Last, in case of conflicts during the project, a moderator must have a point of contact with whom to discuss the stakeholders' concerns and stressful situations (IP13).

The researchers pointed out the organizational history in digitalization projects (IP02). Organizations must recognize the added value for the organization of data-driven projects (IP08). Organizations whose core business is not data must know the advantages of data to join a DE (IP05). Today, data is often available in poorly accessible data silos and of poor quality that hinder organizations from sharing data with other ones (IP05).

> "Data come from different areas of a company. Interdisciplinary exchange between these areas is therefore necessary. It takes persuasion to create the flexibility within the company to exchange data" (IP02).

Moreover, organizational culture influences the acceptance of an DE, and the usage of techniques and methods of the change management (IP04).

5.2.4 Attributes of Change Targets

From a practical perspective, a basic readiness is already assumed if the employee works with data assets (IP01). Otherwise, employees may be convinced, for example, by explanation based on use cases (IP10), and by presenting benefits and impact to create trust in the DE (IP14). The interviewed consultants focused on the factor of collective self-efficacy, like the active involvement of different stakeholders directly from the beginning (IP13).

> "Stakeholders need to engage and participate in the DE. Conviction is not enough." (IP03)

User training can create a trust to carry out changes (IP07). Possible forms are reflection and coaching sessions where stakeholders can voice concerns to counter fears (IP03) and employees' training on the new dashboards (IP09).

The interviewed researchers described barriers that may arise due to a missing collective self-efficacy, like the feeling of DE as a disturbing side project (IP02). In contrast, employees can benefit from freedom in their daily work, appreciation, and adding value for themselves and the entire organization (IP02). Therefore, the information should reach the employees (passive process). They should also feel uplifted and involved in the design and implementation of the DE (active process) (IP08). The continuous training is designed to show how employees benefit from DEs (IP05). Change management tools can be used for this purpose (IP12).

5.2.5 IT Support

The interviewees see the need for first-level support for the users and second- and third-level support for the IT (IP06). It is important to have a centralized contact for the IT support of a DE. Besides the technical view, the IT support should also provide a view from a data engineering and data science site (IP14).

Also, the consultants describe the importance of technical IT support. First-level support is designed to help DE users as quickly and directly as possible (IP13). Second and third-level support help to manage the required IT and supports the next maintenance steps concerning the DE (IP07).

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Researchers consider IT support as mandatory for the implementation of a DE (IP02), which includes the deployment of infrastructure required to participate in a DE.

> "Data processing per se requires IT support. DEs cannot function without IT. IT support is, therefore, a natural necessity." (IP08)

Each DE must make a case-by-case decision based on the requirements of the IT support should be centralized or not (IP12). In large companies, the IT support for the DE should be integrated into the existing IT support, and a separate IT support department should be created for the DE in the future (IP05). For competence and knowledge building, as well as for agile working methods, knowledge databases can be used (IP04). Also, an automatic interface to the tax office is helpful for support on the tax and legal levels (IP05). Security and safety aspects should be considered by the IT support (IP15).

5.2.6 Other Factors

Moreover, other factors were mentioned for the participation in a DE. Thereby, all groups pointed out the need to communicate transparent about the following aspects: Who is the data owner? (IP07), which data are saved? (IP06), where and in which form are the data saved? (IP13), how can the data be used? (IP11), who is allowed to use the data? (IP07).

Moreover, practitioners highlighted the importance of data quality, IT security, and legal regulations. To reach a sufficient data quality, data must become aligned with the applicable definition of data quality and made usable (IP01). A sufficient and good infrastructure ensures a sense of security:

> "Companies often do not have the right technology to process the data, ensure the security of data, and make sure that the data are fully used by maintaining privacy and security. This can lead to everyone being afraid to share data." (IP14)

The access to the systems of an DE must be secured, although this is difficult to build up in retrospect (IP11). Moreover, interviewees mentioned the importance of legal regulations like compliance of the GDPS (IP10). Lawyers and data protection officers could be hired for this (IP01).

The consultants see the importance of data quality, too. Therefore, a unified definition and a data-cleaning process is necessary (IP07).

> "Data cleaning processes must precede participation in a DE so that trust is not lost. When shit goes in, shit comes out" (IP07).

For a DE, the IT architecture needs sufficient technical requirements for collecting and centrally storing data (IP09). The existing IT architecture has an impact on the data quality (IP03). Besides the GDPR (IP09), with the participation of a DE it is necessary to consider an international legal situation because DEs are often internationally configured (IP03). Moreover, protection through authorization access is required (IP07).

From a research perspective a sufficient IT infrastructure is necessary (IP05). Therefore, sufficient security and safety increase acceptance of the DE by treating the data that belong to someone and that someone provides with care (IP15). Finally, it is helpful to consider best practices and standards of local DE initiatives (IP12).

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6. Discussion and Conclusion

6.1 Summary of the Results and Implications

Although interest in DEs has increased, there are still many obstacles when it comes to get in touch with other stakeholders with the intention of data sharing. In this study, we wanted to uncover readiness factors and thus contribute to reducing these barriers to entry DEs among companies. We therefore used and further developed Aziz and Yusof's (2012) concept of ORFs to systematize the preconditions to prepare for the age of the data-sharing economy. The boundaries imposed by such frameworks may constitute a disadvantage in using them for a new context. To overcome this ex-ante limitation, we further developed this framework of ORF, based on qualitative data, which creates one major contribution of this work. We transform the given framework into the context of DE and thereby create a new artifact for the entire DE research community. Further, this work potentially supports the whole change process within DE initiatives.

During our investigation, we found different similarities and differences between the various interview groups. Unambiguous opinions exist, for example, about the visual clarity, the need for top management support and a change agent on the operational level, and the need for data transparency. However, there are differences in external constraints and flexibility. While the focus of practitioners in external constraints is on demographic change and legal influences, researchers and consultants have a broader view on the organization's environment. As the only group of interviewees, the consultants differentiate that higher flexibility is not necessarily an advantage. This could be related to their experience in different projects.

By comparing the results of the SLR and the interview study, we conclude that there are different ORFs that are not part of the current scientific literature. This includes, for example, the factors of positive mentality, change agents, and organizational conflict. As such, our ORF framework provides a new foundation in the field of participation in DE, based on which further research can be carried out.

Furthermore, our findings uncover several readiness factors within newly created domains in our ORF framework. In the context of data protection and data exchange, a lot has happened in recent years, especially at the legal level, for example, in the form of the data governance act and the proclamation of the GDPR in 2018 (Shabani, 2021). As a result, these topics are also becoming increasingly important in the context of DE. The topic of data security has also become important from an internal company perspective. Data security is no longer interpreted only in a repressive manner but also contributes to the company's performance (Fernando et al., 2018). In addition, data quality and data transparency have been emphasized in the interviews, as these are important in inter-organizational data sharing.

6.2 Future Research Opportunities

From conducting our research and analyzing the results, we identified several future research opportunities. First, the interviewees pleaded for leadership support when it comes to implementing a cultural change by stepping into an inter-organizational network. It is a proven fact that top management enhances relationships with other actors within inter-organizational formations (Feng & Zhao, 2014). There is, however, no strategic framework available for executives to moderate preparation strategies in terms of inter-organizational

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efforts in general. Future research should react to this crucial need and develop and design systems to guide top management through those cultural changes.

Second, it was also deemed necessary to break down departmental boundaries via, for example, flatter hierarchies, which can be helpful in these structural changes. Today, it is quite unknown which organizational structure influences readiness in what manner. By adopting organizational design theory (Galbraith & Clark, 1973), future research could investigate manners to measure how specific organizational structures, for example, the level of formalization or of centralization, influence the readiness of organizations to act in DEs.

Third, the interviewees argue that basic readiness is already assumed due to actors' experience with data assets. Data lineage, in general, is an upcoming research stream (Backes et al., 2015) in information systems and business research. Accessing data lineage in organizations was also an optic in the past (Prat & Madnick, 2007) but as a readiness factor for acting in ecosystems, it is still not represented in the research community. Scholars should further interpret data lineage as a maturity model for each employee to assess the readiness to enter inter-organizational formations on the actors' level.

Finally, the newly identified readiness factors pave the way for future investigations. These include the consideration of recent external specifications like the GDPR or data governance act. Furthermore, there are further external restrictions, especially in certain industries, that may influence the ORFs in different domains.

6.3 Limitations

Our study also includes some limitations regarding our qualitative data collection. First, the analysis may reveal ambiguities that are intrinsic to human language. In qualitative analysis, many meanings of uttered words can be identified. In addition, the primary disadvantage of qualitative corpus analysis methodologies is that their conclusions cannot be generalized to larger populations with the same degree of assurance as quantitative studies. This is because the research findings are not examined to see if they are statistically significant or random (Creswell, 1994; Marshall & Rossman, 2014; Ochieng, 2009). Even though we applied several procedures, such as member checks, to prevent bias in qualitative data analysis, it is still possible that our interpretations had some subjective elements. The inability to generalize findings is an additional restriction of qualitative research. A large-scale survey can only attain this objective, but quantitative research is not yet appropriate to the fledgling topic of data ecosystems or even data ecosystem preparedness.

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