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Preparing Future Business Data Sharing via a Meta-Platform for Data Marketplaces: Exploring Antecedents and Consequences of Data Sovereignty

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Abstract Meta-platforms have received considerable Information Systems scholarly attention in recent years. Meta-platforms enable platform-to-platform openness and are especially beneficial to amplifying network effects in highly-specialized markets. A promising emerging context for applying meta-platforms is data marketplaces—a special type of digital platform designed for business data sharing that is vastly fragmented. However, data providers have sovereignty concerns: the risk of losing control over the data that they share through meta-platforms. This research aims to explore antecedents and consequences of data sovereignty concerns in meta-platforms for data marketplaces. Based on interviews with fifteen potential data providers and five data marketplace experts, we identify data sovereignty antecedents, such as (potentially) less trustworthy data marketplace participants, unclear use cases, and data provenance difficulties. Data sovereignty concerns have many consequences, including knowledge spillovers to competitors and reputational damage. This study is among the first that empirically develops a pre-conceptualization for data sovereignty in this novel context, thus laying the groundwork for designing future data marketplace meta-platform solutions.

Keywords: data economy, data sharing, data sovereignty, data markets, platform ecosystems, platform openness, meta platforms.

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1 Introduction

Studies on *meta-platforms* represent a growing field within Information System (IS) literature, especially in a research stream related to multiplatform ecosystems (e.g., Floetgen et al., 2021, Peters et al., 2021). A meta-platform is a platform of platforms, which coordinates, integrates, and connects various existing platforms (Zhang and Williamson, 2021). More recently, there has been a surge of interest in meta-platform research to enable business data sharing among companies, particularly by enabling platform-to-platform openness in niche markets that require high degrees of specialization (e.g., Mosterd et al., 2021, Veile et al., 2022).

Concurrently, recent trends in the European Data Economy have proliferated data marketplace research in IS literature (e.g., Fruhwirth et al., 2020, van de Ven et al., 2021). Data marketplaces are B2B digital platforms that enable secure data sharing between data providers and consumers by providing necessary governance models and infrastructure (Lis & Otto, 2020). The current market landscape in such marketplaces is vastly fragmented, causing expensive vendor lock-in and data discovery difficulties (European Commission, 2020b). Therefore, this fragmented nature opens an opportunity to explore meta-platforms within the data marketplace context. In fact, the European Union has invested in many meta-platform initiatives to achieve a single European Data Market by 2030 (e.g., the GAIA-X[1] and i3-Market[2]). One potential use case of a meta-platform can be described as follows: data providers that are not associated with any marketplaces can directly join a meta-platform to share their business data. In doing so, data providers can reach out to and interact with data consumers from many participating marketplaces.

While meta-platforms are important for amplifying data marketplace network effects, meta-platforms may suffer from one significant challenge related to data sovereignty. Data sovereignty generally refers to the ability to decide and control data usage terms (Lauf et al., 2022). Prior literature highlights that data sovereignty concerns, particularly the risk of losing control over data, hinder data providers' adoption of data marketplaces (Spiekermann, 2019). Data sovereignty concerns have serious consequences. For example, competitors of data-providing companies may benefit from the shared data in unexpected ways (Gelhaar & Otto, 2020).

[1] https://www.gaia-x.eu/ accessed on May 16, 2022
[2] https://www.i3-market.eu/ accessed on May 16, 2022

Considering that these meta-platforms for data marketplaces are to be designed responsibly and utilized, we need to understand data sovereignty concerns in this novel context. We argue that data providers inherit unresolved data sovereignty concerns in the data marketplaces, triggering fears of losing control over data in meta-platforms. Even more, the risk may amplify since data moves across many marketplaces. Nevertheless, data sovereignty concerns in the meta-platform context are currently underexplored. Therefore, **this research aims to explore antecedents and consequences of data sovereignty concerns in the context of a meta-platform for data marketplaces.** We find ten antecedents and four consequences of data sovereignty concerns. The findings can be used to theorize data sovereignty in this emerging context by deriving testable propositions concerning the identified antecedents and consequences.

2 Background

2.1 Data Governance Domains for Data Platforms

We will structure our analysis based on data governance literature for data platforms (Lee et al., 2017; van den Broek & van Veenstra, 2015). This approach is relevant because data governance generally explores issues revolving around control over data ownership, access, and data usage decisions (Lis & Otto, 2021). We consider three data governance domains as a starting point: a) data governance mode, b) data ownership and access, and c) data usage. The *data governance mode* domain explores the decision rights allocation for involved actors and the appropriate mode to adapt (i.e., market, bazaar, hierarchy, or network) (van den Broek & van Veenstra, 2015). Next, the *data ownership and access* domain examines the criteria and allocation for ownership and access. This domain also discusses the contribution estimation for involved actors and the use cases definition (Lee et al., 2017). Finally, the *data usage* domain defines conformance (such as audit process), monitors data usage in data platforms, and ensures provenance to track all data history (Lee et al., 2017).

2.2 Data Sovereignty Concerns in Data Marketplaces

Due to a general paucity of meta-platform research, we will examine data sovereignty concerns in the literature on data marketplaces. Previous studies on meta-platforms also employ this approach to draw the theoretical foundations from (or inspired by) their object of the federation (e.g., Zhang & Williamson, 2021). We will first discuss the antecedents of data sovereignty, which can be classified into the data governance domains presented in Subsection 2.1: a) data governance mode, b) data ownership and access, and c) data usage.

We did not find any data sovereignty antecedents that belong to the *data governance mode* domain—even after reflecting on two recently published data marketplace literature reviews (see Abbas et al., 2021, Driessen et al., 2022). One potential explanation is that the current actor definitions, including their roles and responsibilities, have been adequately well-defined in the extant literature.

In the *data ownership and access* domain, vague data ownership definitions cause data sovereignty concerns (Hummel et al., 2021). Currently, (legal) instruments and models for exercising data ownership are generally less clearly defined due to the nature of data as an experience good (Koutroumpis et al., 2020). Hence, data providers have insufficient guidance in properly defining data ownership and access (Martin et al., 2021). Data policy divergence also causes difficulties in ensuring data sovereignty. For example, the United States lacks explicit database rights, Australia's copyright law safeguards databases, and Canada's approach falls somewhere in between (Koutroumpis et al., 2020). Therefore, keeping up and complying with multiple policy requirements is generally challenging (Scaria et al., 2018). In addition, data sovereignty is hardly achieved due to unclear use cases in the first place, making it ambiguous to define appropriate access for data consumers (Scaria et al., 2018). Finally, the vast amount of data type variation (e.g., multimedia, raw, or machine learning models) also contributes to data sovereignty concerns because data marketplaces need to accommodate appropriate protection mechanisms for each data type (Fernandez et al., 2020).

Related to the *data usage* domain, data providers often face data withdrawal issues. Data sovereignty mandates data providers to accommodate consent revocation from their end-users if requested. Nevertheless, revoking the data access in such

marketplaces, for example, via consent management, is still technically challenging (Xu et al., 2021). Another mentioned antecedent is data provenance difficulties, referring to an inability to track the origin and altered data due to a unique property: data is a non-rivalrous good that can be duplicated inexpensively and utilized concurrently by others (Koutroumpis et al., 2020). Finally, unverified data consumers also cause sovereignty concerns because they may enter the internal system and access confidential information of data providers (or even their end-users) (Lauf et al., 2022).

Data sovereignty has many undesired consequences. Losing control over data is commercially sensitive due to knowledge spillovers (Koutroumpis et al., 2020). Competitors of provided data may benefit from companies that provide data in unanticipated ways, thus jeopardizing their business interests (Spiekermann, 2019). Moreover, data providers also experience data investment loss because free-riding parties may get "free" datasets without sufficient contributions to data providers. When this is the case, data prices fall below the reproduction marginal cost, which is often near zero (Martens et al., 2020). Data providers are also likely to deal with legal liabilities in the case of data misuse by data consumers. For example, GDPR breaches due to inabilities to protect the privacy of their end-users trigger substantial fines and penalties[3]. In addition, data providers generally experience reputational damage in the case of data breaches (Karger, 2020).

3 Research Approach

This study is exploratory because little is known about data sovereignty concerns of business data sharing via a meta-platform for data marketplaces. Given its flexibility, qualitative research is frequently used for exploratory research (Sekaran & Bougie, 2016). We need flexibility when conducting interviews because business data sharing in this context is not yet a well-defined concept. Therefore, often follow-up conversations are required to trigger further explanations from the participants' initial views. Moreover, probing questions are frequently needed to obtain deeper insights in an exploratory study. Hence, this study employs semi-structured interviews as a primary data collection method to support these follow-up and probing conversions (Edwards & Holland, 2013).

[3] https://gdpr-info.eu/issues/fines-penalties/ accessed on May 16, 2022

We employed the judgment sampling approach: selecting our interview participants by considering their expertise (Sekaran & Bougie, 2016). We chose this strategy because we examined a novel phenomenon only a few people understand (cf. Etikan et al., 2016). We aimed to interview data providers and marketplace experts to explore and confirm data sovereignty concerns in the meta-platform context. The criteria for selecting the interviewees were: 1) familiarity with data marketplaces (i.e., know about, have experienced, or have thought of), 2) experience in decision-making activities related to business models or data governance, 3) English fluency.

For potential providers, we were interested in respondents employed by large companies (i.e., companies with 250+ employees) operating in the EU. Large companies generally generate a vast amount of data and have more resources to actively participate in the Data Economy (European Commission, 2020a). We focused on the EU because meta-platform initiatives are expected to flourish due to the availability of policy agendas that support cross-exchange business data sharing in the EU. For experts, we selected participants involved in a meta-platform project because they can provide additional insight into data sovereignty threats. Thus, we interviewed fifteen potential data providers and five data marketplace experts (I-01 to I-15)—See Appendix 1 in the supplementary material for the overview of the participants)[4]. We conducted the online interviews via Microsoft Teams between July and November 2021. The average duration of the interviews was 40 minutes.

We developed a preliminary interview protocol and conducted two pilot interviews to test and refine our protocol. The interviews were divided into three sections (See Appendix 2 in the supplementary material for the detailed protocol). First, we asked about the interviewee's background and knowledge of data marketplaces. Second, we presented the concept of meta-platforms for data marketplaces with a specific use case illustrated in Section 1. Participants could ask for clarifications after the short presentation. We then asked about potential value propositions and hindrances related to a meta-platform for data marketplaces—These questions are essential to check conceptual alignments between the interviewee and the participant. Finally, we questioned the participants about data sovereignty concerns in this specific context. With the interviewees' permission, the interviews were recorded and

[4] The supplementary material can be accessed here: https://doi.org/10.4121/19762360

anonymously transcribed. We sent back the transcription to the participants and asked for their approval, resulting in minor changes for five transcriptions.

We deductively analyzed each interview transcript using Atlas.TI 9.1. The deductive analysis is suitable for an exploratory study (Casula et al., 2021), particularly when we want to compare a specific issue from a previously known context (i.e., data sovereignty in data marketplaces) to a novel phenomenon (i.e., meta-platforms) (Elo & Kyngäs, 2008). We developed an *unconstrained categorization matrix* to code a block of statements into relevant (sub)categories. This matrix is flexible, allowing us to induct new (sub)categories. For instance, we coded *lineage chain limitation* for the following excerpt: "You do not even know a lot about the lineage chain, what is the data behind it?" (I-07); we assigned *unidentifiable dataset* to this sentence fragment: "And there are many good practices that have been developed and that the data markets community doesn't know. For instance, a completely basic principle is to have persistent identifiers. Now, you need to be able to somehow identify datasets in order to be able to for them to be uniquely identifiable within a network" (I-18). Next, we synthesized and grouped those two initial codes into the sub-category of **data provenance difficulties,** which belongs to the **data governance mode** category. We conducted an intercoder reliability check to increase the internal validity of our code (O'Connor & Joffe, 2020), resulting in an overall agreement between coders. The full description of the unconstrained categorization matrix can be found in Appendix 3.

4 Result

Figure 1 pre-conceptualizes the antecedents and consequences of data sovereignty concerns in a meta-platforms for data marketplaces (developed based on the interview findings). We identify ten antecedents, which can be classified into the three main categories described in Section 2.2; we also identify four consequences of data sovereignty concerns.

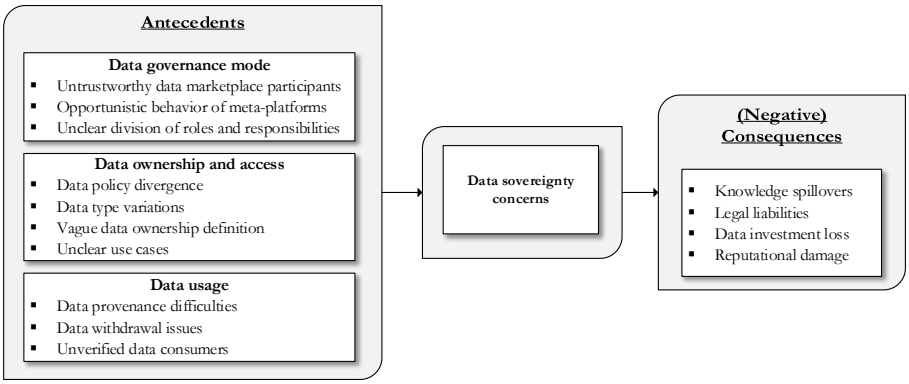

Figure 1: A pre-conceptualization of the antecedents and consequences of data sovereignty concerns in business data sharing via meta-platforms for data marketplaces

We first describe our findings concerning the antecedents that belong to the *data governance mode* category. Owners of meta-platforms need to find participating data marketplaces, but some interviewees questioned whether such **marketplaces are trustworthy.** Data providers are suspicious if specific marketplaces are disreputable intermediaries (I-04). One interviewee (I-01) said: "If a channel [a data marketplace], for instance, is ruled by mafias, you will try to avoid it." Evaluating such marketplaces is problematic because each has its unique operation rules (I-01). For example, while some marketplaces have decent security, others do not (I-12). The next antecedent relates to the (potential) **opportunistic behavior of meta-platforms**. To illustrate this, an interviewee (I-05) commented: "…that the [meta-] platform should not have that privilege of seeing what the data is…or selling data that belongs to one marketplace to another marketplace or things like that." Another interviewee (I-03) expressed: "I am not sure about a middleman [a meta-platform] already. I think, when it comes to data, it should be as transparent as possible." Data sovereignty concerns are also caused by the **unclear division of roles and responsibilities** between a meta-platform and data marketplaces. Without this clarity, control exercises remain ambiguous. For example, one interviewee (I-12) said: "It is definitely tough… Who is responsible for providing proof that the data is secure, that you know the data is of quality, that you know the data ownership is correct?"

In the *data ownership and access* domain, **data policy divergence** triggers data sovereignty concerns. A meta-platform commonly aims to be interoperable across data marketplaces in different countries or industries. Nevertheless, different work rules depend on specific areas (I-01), and the translation of diverse legal instruments between countries is difficult (I-02, I-08). For example, in extreme cases where a meta-platform is interoperable with data marketplaces outside the European Union, some regulations like the General Data Protection Regulation (GDPR) may not be applicable (I-01). Hence, data consumers may face difficulties understanding what they can (and cannot) do with the data (I-13). Subsequently, **data type variations** cause complexity to exercise control. In some cases, data consumers may only want to buy a one-off set of datasets (I-03), whereas the others want to go beyond it (I-05), such as purchasing data streams (I-03). Data requirements like latency and time restrictions may apply (I-03). Because different data types require different treatments, providing suitable control access to safeguard all data types is challenging.

Vague data ownership definitions also cause data sovereignty concerns. For example, one participant (I-10) stated: "What happens to the ownership of the data? Is the ownership transferred to the platform, or is it kept? Is it still owned by the data provider?" Likewise, business data sharing **use cases are less clearly defined** when data assets are advertised via meta-platforms. For example, one interviewee illustrated (I-03): "… I am selling these details, and I do not know why I am selling them." Hence, data usage use cases (recorded in a contract) are often unclear and contain insufficient details. Specific details such as data licensing agreements are also frequently ambiguous (I-13). Moreover, creating clear use cases is complex because more parties are now involved (I-03).

We also identified antecedents in the *data usage domain,* where **data provenance difficulties** are one of the principal causes. Generally, meta-platform characteristics allow providers to share their business data to multiple data marketplaces. Hence, data lineage from data providers to consumers becomes complex because two separate entities exist. One interviewee (I-12) mentioned: "Who is responsible for providing the linage from supplier to buyer if you have two stops, which are two separate entities?... We have two parts in the chain." Therefore, there is a possibility of blind spots in the data lineage in a meta-platform (I-7). Subsequently, data

providers may need to **withdraw data** due to specific reasons. For instance, the end-users (or individual data subjects) want to change the consent and remove their data. Nevertheless, it is not easy to retrieve data when it has been shared. Data providers need to identify which data marketplace sells their data (and to which data consumers) (I-09). Finally, another reason for data control loss is **unverified data consumers.** Potential consumers are registered with specific marketplaces, but the nature of onboarding processes is different (I-12). A marketplace may apply a tight certification, while others do not. Therefore, the possibility of engaging with unethical organizations in specific data marketplaces (or countries) exists (I-07).

Related to the consequences, many participants mentioned **knowledge spillovers to competitors.** Sharing data via a meta-platform can be an endeavor to reach unlimited data consumers from many marketplaces (I-09). Nevertheless, many potential data consumers are competitors, which may benefit from the shared data in unanticipated ways (I-01, I-15, I-19). Competitors can go "…somewhere playing around with our data set to know what is going on" (I-13). Hence, commercial secrets may also be exposed (I-19). Another consequence concerns **legal liabilities.** Losing control over data can make providers liable for violating the EU privacy rules (I-11) such as the GDPR (I-09). Therefore, there will be legal action and consequences (I-18), such as having a dispute (I-01) or paying for the damages (I-13). Interestingly, one interviewee (I-13) mentioned the provider's unfortunate situation, especially if they are big companies: "It is the bigger player in the market that's always going to then bear the brunt of it."

Data investment loss also becomes a primary consequence because data consumers may resell the shared data (I-01, I-03, I-16). One participant (I-19) illustrated: "How do you ensure that they do not just resell it to someone else?" In all, the shared data assets can be freely available to everyone (I-02). Finally, some participants expressed concerns about **reputational damage** (I-01) due to, for example, bad press (I-13) so that people discuss unwanted accidents in the public media like radio (I-02). One participant (I-18) commented: "So the consequences can be really, really huge… it can dramatically damage the reputation of the company..."

5 Discussion and Conclusion

This paper explores the antecedents and consequences of data sovereignty in a meta-platform for data marketplaces. Our findings suggest that the meta-platform characteristics play a significant role in amplifying data sovereignty concerns. Compared to the previously known antecedents in the data marketplace context (see Subsection 2.1), we find three distinctive antecedents (classified in the data governance mode category) in the meta-platform context: a) unclear division of roles and responsibilities between meta-platforms and participating marketplaces, b) opportunistic behavior of meta-platforms, and c) untrustworthy data marketplace participants.

These antecedents emerge because a meta-platform is a newly born entity that aims to federate existing data marketplaces. Nevertheless, knowledge about the interactions and proper institution arrangements between these entities is generally unexplored. For example, meta-platforms may have sufficient power to dictate enabling technologies and infrastructures if they are horizontally integrated by the same parent company (such as Alipay, WeChat, or Tencent) (Coe & Yang, 2022; Zhang & Williamson, 2021). Nonetheless, meta-platforms for business data sharing often emerge from consortium efforts (Floetgen et al., 2021). Hence, having a consensus on governance mechanisms and joint efforts to develop technological standards is challenging (Gelhaar & Otto, 2020). Each data marketplace participant may have internal (technically enforced) governance mechanisms to ensure data sovereignty (Lis & Otto, 2020), but such mechanisms may be incompatible with others (Abbas et al., 2021). Consequently, meta-platforms may behave opportunistically if they can access all traffic data across marketplaces (Lee et al., 2017). For instance, they may expensively charge low-bargaining participating data marketplaces to get forwarded traffics. In addition, another unexplored issue relates to the feasibility of technical integration for data marketplace interoperability. To tackle this issue, initiatives such as the International Data Spaces Association explore REST API-based Dataspace Connector[5] to find potential ways to make this vision a reality.

[5] https://international-data-spaces-association.github.io/DataspaceConnector/ accessed on May 13, 2022

Some antecedents tend to be more complicated (to mitigate) in our new context because meta-platforms enable data asset movement across multiple marketplaces. As indicated in Section 4, for example, data provenance becomes more difficult because we now have two separate entities, making the probability of having blind spots in the data lineage amplifying. Thus, data providers generally do not know what happens when data is transferred. Blockchain-based smart contracts are one of the (future) promising means for data provenance (Moyano et al., 2021), but these may be incompatible with other marketplaces. Although interoperable means such as "side-chain" (or "interchain") are essential due to the nature of meta-platforms that federate existing data marketplace, this initiative is generally still in its infancy (Singh et al., 2020).

We identify four main consequences of data sovereignty: knowledge spillovers to competitors, legal liabilities, data investment loss, and reputational damage. These findings implicitly indicate why data providers fear losing control over their data. Therefore, similar to the previous findings from the extant literature on data marketplaces (cf. Agahari, 2020, 2021; Spiekermann, 2019), we may confirm the inheritance of (and argue that) data sovereignty concerns also negatively influence providers' willingness to engage with business data sharing via a meta-platform. Nevertheless, our proposition is still a "working hypothesis," and further confirmation is needed (see Casula et al., 2021).

We suggest four future research areas considering our research constraints. First, the unit of analysis of this study focuses on the data providers. Future work can explore the data consumers' perspectives to balance the standpoint. Secondly, we focus on a use case of meta-platforms. In other scenarios, data providers may have already registered in a particular market before joining a meta-platform. Exploring more situations can help to provide more affluent antecedents. Subsequently, our interviewees did not experience using meta-platforms for data marketplaces in practice—because many related initiatives are in the development phase, and they engaged with Minimum Viable Products (MVPs) instead. Nonetheless, this work is (part of) and in line with a new IS paradigm so-called "speculative engagement" (Hovorka & Peter, 2021a, 2021b): preparing for the future by speculatively theorizing the upcoming scenarios. Hence, we recommend repeating the exercise with a case study approach to verify our working hypothesis. Finally, given the nature of our qualitative approach, our study cannot be used to generalize to specific

populations. Instead, at this stage, we offer a pre-conceptualization of data sovereignty that is more suitable for developing theoretical propositions (Yin, 2018). Therefore, we call for a deductive approach to confirm our findings in future research.

Our study theoretically contributes to the existing IS digital platform literature, particularly in a research stream related to multiplatform ecosystems (with a specific emerging topic that correlates meta-platforms, data marketplaces, and data sovereignty). We are among the first who conduct an empirical investigation of this topic, thus providing an early conceptualization of antecedents and consequences of data sovereignty concerns in meta-platforms for data marketplaces. In doing so, we provide the stepping stones to theorize data sovereignty in this context. These identified antecedents can also be a basis for developing design requirements for designing (future) solutions, which are common in the Design Science Research approach (Peffers et al., 2007). Future work will explore governance mechanisms to tackle data sovereignty in this meta-platform (see our future planning at Abbas, 2021). Our study also highlights how the meta-platform context plays a pivotal role in distinguishing (and amplifying) data sovereignty concerns in the previously known data marketplaces, especially for the antecedents in the data governance mode category. Further research can also examine other concerns beyond data sovereignty (e.g., business model challenges related to meta-platform viability).

Practitioners can reflect on our identified antecedents to help providers ensure data sovereignty. Specifically, these antecedents can serve as a baseline for future specific works, such as building a threat model. Moreover, policymakers can reflect on this finding to work on macro-areas, such as policy divergence across the EU and legal protection for data assets. We hope a meta-platform can be one distinguished instrument to fulfill what we are optimistic for in a Data Economy: a single European Data Market in 2030.

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