

Business Strategies for Data Monetization: Deriving Insights from Practice

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Abstract. Although increases in available data have inspired companies' interest in creating and extracting value from it, many lack the insight and guidance to assess the potential data offer. To address this issue, we conduct a systematic literature review to create a universe of 102 real-world cases from diverse industries with regard to the use of data. Based on an analysis of these cases, this paper provides a set of 12 generic strategies for monetizing data, ranging from sole asset sale to strategically opening data and guaranteeing control. This study supports business practice by aggregating the wide range of established approaches of data monetization from practice for operational purposes. It advances theoretical understanding of value capturing from data and suggests important avenues for future work in this emerging field of research.

Keywords: Data monetization, data-driven business models, big data, data-driven decision making

1 Introduction

Ever-increasing quantities of available data motivate companies to leverage it for economic benefit [1, 2]. Data is increasingly regarded as a valuable resource bought and sold online as an asset [3]. And indeed, the use and monetization of data can be an actual source of competitive advantage for businesses in the digital economy [4]. As an emerging phenomenon driven by current technological trends in the context of big data, *data monetization* gains importance in both research and practice. Accordingly, the term *data monetization* has been introduced by prior research in the field: Najjar and Kettinger define data monetization as converting the intangible value of data into real value [2]. Similarly, Gartner refers to data monetization as "using data for quantifiable economic benefit" [5]. For the understanding of this work, however, we emphasize that *real and quantifiable value* can occur as both a monetary value and any other quantifiable economic benefit. For example, data can be monetized through increased process efficiency or product improvements that rely on data [4]. The value then becomes *real* through quantifiable, subsequent effects or returns, such as reduced costs, repeated purchases and/or increased market share.

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Building on the above definitions, we understand a *data monetization strategy* as a way an organization pursues to use data for quantifiable economic benefit.

Monetization of data is of growing importance, since it is a critical issue that many industries face today [6]. Business leaders assign a higher priority to the issue of monetizing data compared to questions of technical feasibility [7]. So far, however, companies monetize data only to a very limited extent as shown by a McKinsey Analytics survey in 2017 [8]. This indicates that many companies struggle to extract economic value from their data. Indeed, a step towards data monetization can be very challenging for organizations in practice as its adoption usually requires organizational changes and technological upgrades [4]. In order to stay competitive, companies need to assess and prepare their existing business models with regard to the use of data [1]. Accordingly, for companies it is important to identify the most promising opportunity to start their data monetization efforts [4].

In contrast to their immense importance for practice, strategies for monetizing data are an under-investigated topic [6, 9] and data monetization best practices have yet to be identified [2]. As Najjar/Kettinger and Günther et al. point out, reliable strategies to support practical efforts are required [2, 10]. Investigating how companies actually leverage available data to improve their businesses and operations can support practitioners in overcoming barriers to utilizing data [11]. Consequently, there is a need for research on data monetization strategies. To address this issue and to deepen the understanding of companies successfully using data for economic benefits, we aim at investigating the following research question (RQ): *How do organizations monetize data?* In addition, we intend to examine the *economic benefits* that arise from different data monetization strategies.

To answer this RQ, this study provides an in-depth analysis of case studies of different industries, business types, and business sizes to deepen theoretical and practical understanding of data monetization. Based on a literature review, we created a set of 102 cases, from which we extracted a comprehensive set of generic monetization strategies. Since we investigated monetization strategies independent of volume, variety, and velocity of data, we use the more general term "data" instead of "big data" in this study, although some of the case studies were presented in the specific context of "big data". By addressing calls for additional research concerning implications and strategies of data monetization in companies [1, 2, 10], we aim at extending previous theoretical findings through an exploratory approach. This contribution depicts the state of the art in this continuously evolving field of research. Furthermore, we support practitioners' efforts to assess and decide on appropriate business strategies for data monetization.

2 Related Work

Research on data monetization is tied to closely related topics such as "data-based" or "data-driven" business models (DDBM). Accordingly, this section summarizes relevant findings from both fields that have an impact on this study.

Academic literature has rarely discussed data monetization and DDBMs in general, as both are emerging fields of research [6, 12]. An important part of previous work has focused on case studies providing detailed insights into different approaches to data monetization in enterprises. Najjar and Kettinger conduct an in-depth study in the retail industry [2] analyzing different stages of the company's data monetization journey. In addition, they discuss in detail how the company benefits from this strategy. Similarly, Alfaro et al. present insights from BBVA, a global financial group, pursuing three different data monetization strategies [13]. Further empirical studies with a focus on the usage of data in enterprises for economic benefit encompass different domains such as manufacturing [14-16], online platforms [17-21], aviation [22], start-ups [12], finance [13, 23], open data [24-28] or further (and mixed) domains and industries [1, 11, 29-38]. They form the basis of this study (as presented in detail in the next section).

Focusing on theoretical findings with regard to strategies on data monetization, previous studies propose two frameworks in academic literature. Walker presents four overarching "data strategies", each of them instantiated by underlying approaches for monetization purposes [39]. These monetization strategies are illustrated in detail through comprehensive examples for firms. Further, Wixom and Ross introduce three high-level directions for data monetization as well as corresponding examples from the business world: improving internal processes, wrapping information around products and services, and selling information offerings [4]. Likewise, research on DDBMs provides some studies with relevant findings in the context of strategies for data monetization. Hartmann et al. [12] review literature in terms of existing dimensions of business models and derive a framework for DDBMs. They introduce a definition of a DDBM as a "business model relying on data as a key resource" by including the following (resulting) business model dimensions within their framework: data sources, key activities, value proposition, customer segment, revenue model and cost structure [12]. Schüritz and Satzger investigate five patterns of data-infused business model innovation [1] examining the influence of data on different dimensions of a business model. Furthermore, Zolnowski et al. identify business model transformation patterns of data-driven innovations [36]. Further studies explore revenue models for data-driven services used by start-ups in detail [40] or focus on key success factors [33] and capabilities [16] for innovating business models through digital data streams. Prior work has also suggested the use of business model patterns, some of which focus on selected aspects of the use of data, such as *Data as a Service* and *Database Marketing* [41]. These patterns however, only contain limited options for businesses to monetize their data.

Although prior studies as presented above support and advance general understanding of data monetization, academic literature does not provide a comprehensive and empirically developed overview of strategies on data monetization so far. Therefore, based on the initial set of data monetization strategies from Wixom and Ross [4], we investigate this phenomenon with a method that has not been applied in this context. For this purpose, we choose a systematic bottom-up approach, turning empirical

results into theoretical evidence to close this gap addressing specific calls for further research [1, 2, 10]. In answering our research question on this emerging topic, we provide a structured overview on data monetization strategies to guide and support decision makers in strategic planning. Furthermore, we add descriptions to each of the resulting data monetization strategies and reference back to the original cases. Finally, we investigate specific benefits that arise from applying each strategy in practice.

3 Research Method

To investigate strategies of data monetization, we divided our research approach in four steps, as shown in Figure 1.

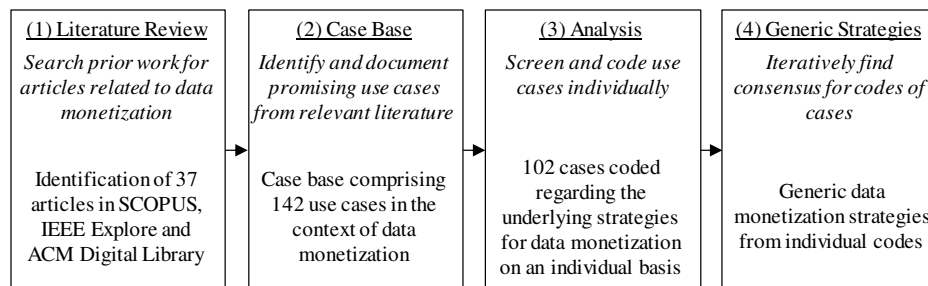


Figure 1. Four-step research approach for deriving generic data monetization strategies

First, we reviewed prior literature on empirical studies of data monetization and DDBMs. In order to find relevant articles, we searched the scientific databases SCOPUS, IEEE Explore and ACM Digital Library for journals and conference papers using the term “data” in conjunction with terms such as “monetization”, “exchange”, “value”, “fee”, “revenue” and “pricing” and their possible variations. The search resulted in 499 hits, comprising 37 relevant articles. As selection criteria for our review, we focused on the following: (1) we only included papers treating at least one real-world use case. (2) From these, we filtered for papers that provided enough information on the respective case(s) and the applied data monetization strategies based on our definition of data monetization. This step borrows from the second step of case survey methodology as proposed by [42].

In the second step, we created a case base comprising 142 cases described in relevant articles. To augment the cases and ensure data triangulation [43], we manually searched for information about the case study’s business models and data monetization approaches. After checking all cases for sufficient information, this resulted in 102 cases for further consideration. The resulting final case base comprises an exhaustive overview of cases from multiple industries, such as manufacturing, finance, tech, travel and telecommunications. Further, it covers companies of different size, representing a diverse set of SMEs and big companies, but also companies of different age like start-ups, new tech companies and incumbents. Additionally, the

cases differ in their underlying business models, ranging from classical linear value creation to complex multi-sided platforms.

Third, the coding team of three screened all excerpts of cases in the case base and derived a first set of codes in a bottom-up approach. While inductively analyzing qualitative data, we borrowed from procedures of grounded theory methodology [44]. Thus, we initially associated about 180 codes to 102 cases. In the next step, we grouped codes to categories in an axial coding step, while identifying relationships among codes (Table 1) [44]. Using theoretical memos helped us to account for ideas during coding [44]. During selective coding, the core categories emerged and the relevant strategies were identified.

Table 1. Illustration of coding scheme

Excerpt from literature in case base	Initial Codes	Generic Strategy & Economic Benefit
<p>“Lufthansa uses Big Data to minimize delays: Predict network behavior and departure delays of aircraft throughout the day, taking into account</p> <ul style="list-style-type: none"> • Reactionary delays, rotation oriented, and • Weather and congestion at airports. [...]” <p>“Benefits include:</p> <ul style="list-style-type: none"> • Decreasing financial loss due to delays, [...] [22] 	<ol style="list-style-type: none"> 1. Increase Process Efficiency 2. Decision Support 3. Data Collection 4. Optimize Process 	<p><i>Business Process Improvement</i> leading to <i>Cost Reduction</i></p>

Finally, the individual results were consolidated and a final set of generic data monetization strategies was derived based on a consensus of the research team. Within this step, the team aimed at finding a good balance between individuality and generality of the strategies. As a result, we derived each resulting strategy from at least three different real-world business cases, corroborating the findings. Furthermore, we assured the resulting set of strategies represents all monetization strategies found in our case base.

4 Data Monetization Strategies

This section presents our findings from aggregating, analyzing, and consolidating business cases of data monetization to answer the RQ posed in the Introduction. An overview summarizing all strategies is illustrated in in Table 2.

4.1 Asset Sale

In accordance with established findings, our case analysis shows that firms frequently sold data solely as an asset. However, we identified further differences in the provision of data sold to third parties. First, data was sold directly to customers, granting them full control of the asset (Strava [17], Factual [32], Verizon Wireless [1]). In other cases, such as LinkedIn [19], data could only be accessed and read by (paying) customers on a query basis, keeping control of the dataset as a whole. Finally, Gnip [35] and InfoGroup [32] sell data to customers in real-time according to predefined criteria, mimicking a ‘data-as-a-service’ strategy.

Economic benefits comprise the creation of new revenue streams and the extension of the customer base.

4.2 Business Process Improvement

Another promising way to monetize data is to improve or optimize existing (internal) business processes. Based on our case base, we discovered several different opportunities for converting data into real business value in the context of business process improvement. Enterprises used data to increase process efficiency (Lufthansa [22], Saarstahl AG [1], Thyssenkrupp [16], UPS [34], Suning Commerce Group [15]), to improve process transparency (Lufthansa [22]), to support information (7-Eleven Japan [11]), and to monitor performance (Deutsche Bank [34]). Furthermore, data was used to improve safety within business processes (UPS [34]).

Economic benefits comprise cost reduction, increase of sales and productivity, detection of inconsistencies and fraud or decision support.

4.3 Product / Service Innovation

Creating completely new offerings to customers based on data is a strategy companies apply regularly. This strategy comprises new products and services that are either fed with data or created newly based on insights from data. For instance, IBM created a new service around sensors in homes of elderly people to measure basic vitals and monitor their daily operations [30]. Based on this data, anomalies can be detected and concerned services notified, reducing assistance costs up to 30 percent [30]. Other companies use data to create innovative services for customers extending the core offerings (Netflix [21], DHL [33]), especially in the case of product maintenance (Siemens [16], Thyssenkrupp [16], Pirelli [14]).

Economic benefits comprise the creation of new revenue streams and new business segments.

4.4 Product / Service Optimization

Using data to optimize or improve existing offerings is one of the basic strategies to create value from data. In such cases, businesses might collect data from their products or services (Pirelli [14]), through additional efforts (Nike+ [17], Haier Group

Corporation [15]), or source it externally, e.g. from third parties (Zara [35]). Products and services can be improved constantly based on continuous data collection (Ford [29]). Furthermore, existing (customer) services can be improved by augmenting customer profile information with external data to improve interactions and decipher customers' needs (Lufthansa [22]).

Economic benefits comprise the improvement of customer experience, reputation and increase of sales.

4.5 Data Insights Sale

Selling information / knowledge derived through any processed step of insights making is a strategy we observed in 17 cases. Insights from data can not only be derived from analytics (TrendSpottr [12], Asiakastieto [26]), but also from different ways of visualization, as we found in the cases of Sendify [12], Flo Apps [26] and Olery [35]. Other examples of this strategy meeting a B2C context abound in commonly used comparison portals (DealAngel [12], Car Spotter [27]).

Economic benefits comprise the creation of new revenue streams and business segments.

4.6 Contextualization

Strategic use of certain kinds of data can create additional value to customers or internal processes in specific contexts. Context-related data include, for example, weather, social media, location-based and domain-specific data. In contrast to individualization, contextualization does not rely on individual data and profiles, but focuses on the contextual aspects rather than the distinct or personal. Examples for contextualization of data to create economic benefits can be found in dynamic and contextual pricing as confirmed by the cases of the Major League Baseball [29] and Staples [1]. Walmart in contrast uses contextualized data, to recommend consumers products that were often bought together [34].

Economic benefits comprise the optimization of prices and increase of sales.

4.7 Individualization

The individualization of certain aspects of a company's value proposition based on data is another source for generating additional value. This strategy is based on the use of data, which is linked to certain customer profiles, making it possible to create value for consumers and businesses on an individual basis. This strategy is often applied in the area of marketing (Baixing [18], eBay [34]), and especially through individual recommendations (Amazon [35], Netflix [21], eBay [34]) or personalized advertisements (Runtastic [17], Facebook [19]). Another possibility is to individualize product or service offerings to business partners based on individual customer data (Daimler FleetBoard [1]).

Economic benefits comprise the improvement of customer experience, increase of sales through personalized marketing or customization of products and services.

Table 2. Data monetization strategies

Data Monetization Strategy	Short Description	Excerpt from the Case Base
1. ASSET SALE	Economic benefits result from additional revenue based on provision/sale of data or from granted access to (own) data.	Strava [17], Factual [32], Verizon Wireless [1], LinkedIn [19], Twitter [17]
2. BUSINESS PROCESS IMPROVEMENT	Value from data is created through improvement or optimization of internal business processes.	Lufthansa [22], Saarstahl AG [1], Thyssenkrupp [16], UPS [34], Deutsche Bank [34]
3. PRODUCT / SERVICE INNOVATION	Extending the existing range of offerings to customers with new products or services based on data.	IBM [30], Rolls Royce Aircraft [1], DHL [33], Netflix [29], Siemens [16]
4. PRODUCT / SERVICE OPTIMIZATION	Optimizing existing products or services by utilizing data.	Ford [29], Lufthansa [22], Thyssenkrupp [16], Zara [35], Pirelli [14]
5. DATA INSIGHTS SALE	Selling information/knowledge derived through any processed step of insights making (analytics, visualization, etc.) based on data.	Olery [35], Sendify[12], DealAngel [12], Asiakastieto [26]
6. CONTEXTUALIZATION	Using context-based data to generate economic benefits.	Major League Baseball [29], Staples [1], Walmart [34]
7. INDIVIDUALIZATION	Customer linked data is used to individualize certain aspects of a company's value proposition on an individual basis.	eBay [34], Daimler FleetBoard [1], Netflix [29]
8. BUILD & STRENGTHEN CUSTOMER RELATIONSHIP	Data is leveraged to create and maintain lasting relationships with customers.	Rolls Royce Aircraft [1], Wells Fargo [34], NBC Universal [11], DHL[33]
9. STRATEGICALLY OPENING DATA	Opening (internal) data to business partners or 3rd parties for value co-creation, increased visibility or other advantages.	DrugCo (anonymized) [2], APIbank (anonymized) [23], Helsingin Sanomat [26]
10. DATA ENRICHMENT	Data enrichment means any aggregation of internal or external data sources as well as further processes of transformation or cleaning of data for economic benefits.	InfoGroup [32], Gnip [35], Zara [35], Walmart [34], DealAngel [12]
11. DATA BARTERING	Data bartering occurs when (own) data is exchanged in return for valuable assets such as tools, services or data.	Asiakastieto [26], Factual [32], retailers (anonymized) [11]
12. DATA PRIVACY AND CONTROL GUARANTEE	Data that is derived from the interaction with customers is monetized by guaranteeing of <i>not</i> using them or providing control over the data to the customer.	DuckDuckGo [38], Cozy [38], Meeco [38], Gigya [20]

4.8 Build and Strengthen Customer Relationship

Firms can leverage data to create and maintain lasting relationships with customers. For this purpose, firms regularly focus on leveraging data to obtain customer behavior and customer needs (NBC Universal [11], Lufthansa [22]). Moreover, in many cases data is used to infuse innovative services and create repeat purchases. For example, companies bind customers through additional data-based services like efficiency monitoring (Rolls Royce Aircraft [1]) or ensuring customers the lowest prices by monitoring competitors (Walmart [34]). If specific or unique data, insights or data-driven services become essential to a customer's business model, a data-induced 'vendor lock-in' effect may occur.

Economic benefits comprise the optimization of customer acquisition and retention strategies, increased customer trust and confidence, enhancement of customer loyalty and satisfaction and creation of recurring revenue.

4.9 Strategically Opening Data

Strategically opening data to business partners is a promising source of economic benefits that companies intuitively hesitate to pursue. Companies use this strategy for granting third-parties and suppliers access to specific parts of their business data landscape via APIs [2, 23, 26]. Third parties use this data to build additional products and services or to align their processes to extend value propositions and create ecosystems and networks.

Economic benefits comprise leveraging business partner capabilities, enhancement of value co-creation, new partnerships, cost-sharing and increase of visibility.

4.10 Data Enrichment

Data enrichment is the aggregation of internal or external data sources as well as any subsequent processes of transformation or cleansing of data. Aggregating or transforming data sources already may provide economic value, and represents the predominant value proposition of several case companies (InfoGroup [32], Gnip [35]). Consolidating the data landscape is especially useful among large companies by making important internal data and information directly available to other departments of the company [2].

In most cases, however, this strategy constitutes an essential and preliminary stage of further purposes and is therefore frequently combined with other strategies in the analyzed data set (See *5.1 Combination and hierarchies of data monetization strategies* for a more detailed discussion of this aspect).

Economic benefits comprise the improvement of (internal) value creation, increase in the availability of data / information or extension and verification of datasets.

4.11 Data Bartering

Data bartering occurs when a company exchanges data in return for valuable assets. Hence, data is used for quantifiable benefits through exchanging them for other data, insights, tools and services or special deals [11].

Examples include providers of data and analytics that individually grant discounts based on contributions to the companies database (Factual [32]) or by directly exchanging data with business partners in finance (Asiakastieto [26]). Furthermore, data bartering frequently occurs in the retail industry, when point-of-sales data is bartered, for example, for demographic information or analytics software [11].

Economic benefits comprise the exchanged value in the form of, for example, tools, services or data.

4.12 Data Privacy and Control Guarantee

From our findings, we derived an emerging strategy for monetizing data that constitutes a contemporary “anti-pattern” to existing strategies. Businesses that collect data from interactions with their customers (frequently B2C) can retrieve economic benefits from this data by *not* using it or by granting customers full control over their data.

Therefore, through guaranteeing privacy and control, recorded customer data is converted into valuable benefits such as increased customer loyalty or market share. Cases can be found predominantly within web-based services such as search engines (DuckDuckGo [38]), private data management tools (Meeco [38]), or customer identity management platforms (Gigya [20]).

Economic benefits comprise the increase of market share, customer loyalty and better image and reputation.

5 Discussion

This section discusses further insights from our research and analysis of the case base. Additional findings include the combination of data monetization strategies and aspects of giving away data for monetization, which, according to our case base, happens only in platform ecosystem settings.

5.1 Combination and Hierarchies of Data Monetization Strategies

The monetization strategies presented in Section 4 are not mutually exclusive, but occurred in different combinations throughout the use cases. A majority of cases showed a combination of different strategies. Data Enrichment was the strategy we were able to identify in 46 of the cases. Further, the strategy has been used in combination with other strategies most often. In many cases, data is enriched initially, combining different data types, usually from different (i.e., internal and external)

sources. Therefore, building capabilities to collect, store, combine and handle data can be labelled as a key to monetizing data.

Another aspect we encountered in cases where we identified the combination of monetization strategies, is a certain hierarchy within the monetization strategies. One strategy often became the basis for other strategies to be combined with. For further advancement of the field, future studies may uncover certain archetypes, dominant combinations or a comprehensive taxonomy of data monetization strategies.

5.2 Openness of Data in Platform Ecosystems

Monetizing data by giving it away for the use by third parties is one strategy we identified from our case base. We found this strategy mainly in the context of digital platforms, which use data as a means for value-co-creation and managing platform complementors. When sharing data with partners, thus opening their digital platforms, owners seek to stimulate growth in their ecosystems [45, 46]. In this context, data is also considered a boundary resource, which can enable value generation and capture within an ecosystem [47]. Further, governance of data within an ecosystem is an issue that arises when opening proprietary data to third parties. Lee et al. (2018) present a contingency-based approach for data governance in platform ecosystems, giving proof that the governance and openness of data relies on a multitude of contingencies [48]. Platform owners need to consider these contingencies when opening up their data for future monetization.

6 Future Research

Our findings suggest further studies of data monetization and the use of data to create and capture additional value. We will outline these avenues in the following.

As mentioned in Section 5.1, the initial set of data monetization strategies found in this study could be the basis for further theoretical contributions. First, we propose the development of a well-founded taxonomy for data monetization in companies in order to structure multiple ways of data monetization. Furthermore, future research could work on additional factors concerning data monetization strategies such as *success* or *degree of complexity* to support practical adoption on data monetization.

In the case that data is treated as an asset, our analysis showed that there exists a wide range of different approaches for releasing data to customers and capturing value. For example, different ways for freemium revenue models occurred, where mostly the "premium" part differed in multiple ways (e.g., parts of the data or stale data was free). Future research could tackle this issue by investigating revenue models on data as an asset in detail.

The issue of data privacy has gained huge attention in recent years. Regulators are introducing measures to oppose recurring numbers of privacy violations. Specifically, the European Union and the United States Congress have begun to address these issues. From the perspective of this work, we expect strategies for data monetization to focus even more on issues around privacy, ownership and control of data. First,

future work may assess possibilities for new, innovative strategies to monetize data in the context of data privacy. Second, based on these possibilities, conceptualizing monetization strategies is an important task for future work.

Due to the case base underlying our study, this paper described data monetization from a business perspective. Nonetheless, considering the view of private users is also worthwhile, since some of our derived strategies already touch on this perspective (e.g., bartering private data for using apps and services or selling private data as an asset). Future research may investigate the user-centric perspective to derive further insights as well as interrelations with the company perspective. This research avenue could further educate users on their possibilities and encourage them to handle and use their data more purposefully, strengthening users' data literacy.

The context of monetizing data by *Strategically Opening Data* opens promising paths for future research. Touching on aspects of value co-creation, boundary resources, and data governance, future work may focus on strategic management of open data and its implementation. Giving away valuable assets to third parties while generating additional value creates a natural tension that warrants examination in more detail. We further encourage researchers to investigate this strategy in the context of platform growth and the role of opening data to increase participation of third parties in platform ecosystems. Generally, giving away intellectual property, such as data within software ecosystems for purposes of increasing adoption yields abundant opportunities for further investigation.

7 Conclusion

The goal of this paper was to derive generic data monetization strategies that have proven effective in practice. Drawing upon 102 business cases, we therefore examined recent approaches and strategies to convert business-related data into economic benefits, with the goal of creating a reliable representation of the state of the art in data monetization. Our findings have implications for theory and practice: First, they support theoretical understanding in this rapidly changing field of research by providing an empirically developed foundation for data monetization strategies and their economic benefits. Accordingly, we address recent calls for extending prior work on the field and propose several starting points for further investigation of the topic. Second, this study bundles various possibilities to engage in the important issue of utilizing available data, providing managers an overview of strategic options. In conclusion, this work offers decision-makers appropriate guidance to take a step towards monetizing their data resources.

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