The Impact of Data Orchestration on Data Value Generation in the Judicial Data Ecosystem.

Felipe Fonseca Salerno[a], Antonio Carlos Gastaud Maçada[b], Juliana Obino Mastella[c]*

[a] Programa de Pós-Graduação em Administração, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil, 00193140@ufrgs.br, 0000-0003-1305-7957

[b] Programa de Pós-Graduação em Administração, Universidade Federal do Rio Grande do Sul, Porto Alegre, RS, Brazil, acgmacada@ea.ufrgs.br, 0000-0002-8849-0117

[c] Tribunal de Justiça do Estado do Rio Grande do Sul, Porto Alegre, Brazil, jmastella@tjrs.jus.br, 0009-0009-7439-6988

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Abstract. This study investigates the role of data orchestration in enhancing data value generation within the judicial data ecosystem, grounded in Resource-Orchestration Theory (ROT). Data orchestration is defined as a multidimensional construct comprising data strategy, data governance, synergy, and technological infrastructure. These dimensions collectively facilitate the integration and coordination of data resources, processes, and stakeholders to maximize data value. Guided by the principles of ROT, which conceptualizes data as strategic resources to be structured, bundled, and leveraged, this study emphasizes the importance of orchestrating data resources to enhance their value within the judicial data ecosystem, where diverse actors and complex systems interact, ensuring data is effectively utilized as a strategic asset. A quantitative methodology was employed, with a survey conducted among experts from Brazilian courts and councils. Regression analysis was used to evaluate the relationship between data orchestration and data value, revealing a significant positive effect (0.687, $p < 0.001$), with data orchestration explaining 45.6% of the variance in data value. These findings demonstrate that coordinated efforts to align data-related resources and practices significantly enhance the value generated from data within the judicial ecosystem. By operationalizing ROT in this context, the study provides empirical evidence of how data orchestration contributes to improving the strategic potential of data in data ecosystems. The research advances theoretical understanding of ROT in the field of data ecosystems and offers practical insights for improving data management and governance in judicial settings. Although limited by sample size, the study opens pathways for future research to explore additional dimensions influencing data value generation and to validate these findings in other institutional contexts, acknowledging that generalizability is constrained by the specific characteristics of the Brazilian judicial data ecosystem.

Keywords. Data orchestration, data value, resource orchestration theory, data ecosystems.
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1. Introduction

Data orchestration is a broad concept that encompasses the integration of data strategy, data governance, synergy among stakeholders, and technological infrastructure (Schreieck *et al.*, 2022; Queiroz *et al.*, 2020). Data strategy involves planning how information is collected, analyzed, and shared to achieve organizational objectives (Gür *et al.*, 2021). Data governance establishes norms and responsibilities to ensure quality, security, and ethical use of information (Abraham *et al.*, 2019). Synergy fosters effective collaboration among various stakeholders (Cui & Han, 2022), while technological infrastructure supports interoperability and scalability of implemented digital solutions (Teece, 2020; Gupta *et al.*, 2020).

Through the lens of Resource-Orchestration Theory (ROT) (Zhang *et al.*, 2022), orchestration highlights the importance of strategically coordinating human, financial, technological, and informational resources to create value. ROT posits that organizations embedded in ecosystems can structure and bundle resources optimally,

enabling them to respond to changes and generate value through efficiency and cost reduction, among other benefits. Within data environments, the strategic coordination of informational resources modernizes management practices and strengthens evidence-based decision-making (Queiroz *et al.*, 2020).

In the context of the Brazilian Judiciary, the efficient coordination of resources is particularly relevant. The Judiciary is organized into multiple instances and bodies—such as superior, federal, state, and district courts—reflecting the complexity of the judicial ecosystem established by the 1988 Federal Constitution (Brazil, 1988). While this institutional diversity is important for ensuring autonomy and independence among courts, it also creates challenges that require coordinated actions to meet growing demands for transparency and effectiveness. The National Council of Justice (CNJ) functions as the orchestrator of this ecosystem, promoting programs that integrate technology and innovation to modernize the Judiciary and improve access to justice (CNJ, 2023). For such initiatives to succeed, reliable and integrated data are indispensable, allowing the CNJ to align administrative practices, monitor court performance, and implement evidence-based public policies.

Building on this institutional arrangement, this paper conceptualizes the judicial data ecosystem as a domain-specific, orchestrated environment regulated by the CNJ (Oliveira & Lóscio, 2018; Gelhaar *et al.*, 2021). Within this framework, structured and centralized data management enables evidence-informed decision-making across judicial institutions. Data orchestration emerges as a strategic approach, with the potential to enhance analytical capabilities through big data applications (Mikalef *et al.*, 2023). The integrated analysis of large datasets generates insights that inform policy design, resource allocation, and operational efficiency. Moreover, the standardization and centralization of data contribute to greater transparency and help build public trust in judicial services, reinforcing the Judiciary's role in promoting citizenship (Salerno & Maçada, 2024a; Nikiforova *et al.*, 2024).

These dynamics are reflected in specific CNJ-led initiatives that exemplify the orchestration of data resources in practice. One such initiative is DataJud, which centralizes procedural data from all Brazilian courts (CNJ, 2022). By offering thematic dashboards, DataJud makes a wide range of information available to support institutional decision-making and the formulation of evidence-based public policies. This initiative is embedded within the broader Justice 4.0 Program, which promotes the adoption of technologies such as artificial intelligence and big data to enhance judicial efficiency and the quality of services provided by the courts (Barreto & da Costa, 2020; Vivian, 2020).

Despite its advantages, implementing data orchestration in the Judiciary faces significant challenges, including cultural resistance, limited technical training, and insufficient interoperability among systems of different courts (Castro, 2022; Vivian, 2020). Moreover, ensuring data security and privacy, especially regarding sensitive information, requires ongoing investments in technology and governance (Mikalef *et al.*, 2023).

These limitations highlight the complexity of advancing data orchestration and reinforce the need to better understand its actual contribution to data value generation within judicial ecosystems. Against this backdrop, the present study investigates the following question: *What is the impact of data orchestration on data value generation in the judicial data ecosystem*? To address this question, an exploratory quantitative methodology was adopted, employing a survey among experts from Brazilian courts and councils. The goal is to provide empirical evidence on the relationship between data orchestration and data value, contributing to the refinement of Resource-Orchestration Theory and to improved judicial data management.

2. Theoretical Framework

This section presents the theoretical framework underpinning the research, beginning with the foundations of Resource-Orchestration Theory, the core theory informing the phenomenon under study. Subsequently, the concept of data orchestration is developed as a construct comprising four interrelated dimensions: data strategy, data governance, synergy, and technological infrastructure, each detailed in subsequent sections.

2.1 Resource-Orchestration Theory

Resource-Orchestration Theory (ROT) is a theoretical approach widely used to analyze how organizations structure and manage resources to achieve strategic objectives in dynamic environments, such as ecosystems. Although originally developed in private sector contexts (Sirmon *et al.*, 2007; 2011), ROT has been increasingly applied in public administration, where resource alignment and coordination are also important (Gao *et al.*, 2022). ROT asserts that the value of a resource lies not only in its possession but also in an organization's ability to orchestrate it effectively through three key processes: structuring, bundling, and leveraging. These processes enable organizations to identify strategic resources, combine them efficiently, and use them to create value through mechanisms such as efficiency and cost reduction (Queiroz *et al.*, 2020).

Structuring involves identifying and mobilizing available resources to ensure their accessibility and alignment with

organizational objectives. Bundling entails combining resources in a complementary manner, creating synergies that enhance their utility. Finally, leveraging refers to the strategic use of resources to maximize their impact, capitalizing on opportunities and effectively responding to external threats. This approach is particularly relevant in data ecosystems, where multiple actors interact and share information to pursue common goals (Lin *et al.*, 2023; Zhang *et al.*, 2022; Sirmon, 2007).

Queiroz *et al.* (2020) argue that orchestration positively impacts ecosystems, with the phenomenon surpassing the sum of individual effects. In the data context, orchestration enables value generation that exceeds individual contributions. Autio (2022) highlights the utility of ROT in digital ecosystems, where coordinating intangible assets such as data enhances management practices. Additionally, Salerno and Maçada (2024a) emphasize that in ecosystems like the Brazilian Judiciary, data orchestration fosters the alignment of strategic initiatives and improves data quality.

By centralizing and integrating information through technologies such as DataJud, ROT principles can be applied to the judicial data ecosystem. ROT thus provides a theoretical foundation for analyzing how data, treated as strategic resources, can be structured and bundled to generate value (leveraging). After exploring these theoretical foundations, the next section elaborates on the concept of data ecosystems.

2.3 Data Ecosystems

Data ecosystems integrate organizations, technologies, processes, and stakeholders in a collaborative environment where data is collected, shared, and utilized as a strategic resource (Guggenberger *et al.*, 2020). This concept is especially pertinent in a context of intense flow of information. According to Oliveira and Lóscio (2018), a data ecosystem can be defined as a complex and interconnected network of organizations, technologies, and individuals utilizing data as a fundamental asset for their activities. This definition reveals the dynamic nature of ecosystems, where interactions among participants are pivotal for maximizing data value. Nikiforova *et al.* (2024) add that data ecosystems evolve over time, influenced by technological advancements, regulatory changes, and societal demands. Gelhaar *et al.* (2021) highlight that data ecosystems differ from other informational systems due to their capacity to foster collaboration among multiple actors, often from distinct sectors. These ecosystems are characterized by adaptability, resilience, and the ability to evolve based on new data and technologies. Furthermore, transparency and interoperability among systems and actors are critical elements for a data ecosystem's success.

Guggenberger *et al.* (2020) note that data ecosystems comprise several interdependent components, including data as a central resource, where its quality and accessibility are fundamental for effective functioning. The literature also emphasizes the use of data for analyses, modelling, and decision-making by ecosystem participants (Xu & Pero, 2023). Another essential aspect involves technological infrastructure, which provides the foundation for data collection, storage, processing, and dissemination. Platforms and solutions based on artificial intelligence often leverage data ecosystems (Nikiforova *et al.*, 2024; Gupta *et al.*, 2020). Weber *et al.* (2024) demonstrate that well-structured ecosystems transform data into strategic insights, fostering value generation.

Nikiforova *et al.* (2024) propose an evolutionary model of data ecosystems identifying six distinct generations, ranging from systems focused on raw data to intelligent ecosystems leveraging emerging technologies like artificial intelligence and machine learning. Oliveira and Lóscio (2018) distinguish between open ecosystems, emphasizing unrestricted data sharing among participants, and orchestrated ecosystems, characterized by a central actor regulating interactions and establishing norms. This typology is particularly useful for understanding complex ecosystems like the Brazilian Judiciary, where the CNJ acts as an orchestrator by promoting data integration through DataJud (CNJ, 2022).

The creation of DataJud, as part of the Justice 4.0 Program, demonstrates the potential of data ecosystems to centralize information, promote integrated analyses, and enhance administrative efficiency. This initiative reveals the significance of inter-institutional collaboration and technological interoperability in modernizing judicial services (CNJ, 2023; Barreto & da Costa, 2020). The concept of a judicial data ecosystem, as employed in this study, is a domain-specific, orchestrated data ecosystem (Oliveira & Lóscio, 2018; Gelhaar *et al.*, 2021), characterized by regulated interactions among institutions under a central orchestrator—the CNJ. This setting aligns more closely with the structured ecosystem model discussed by Nikiforova *et al.* (2024), in contrast to fully open data ecosystems (Weber *et al.*, 2024).

Having established the foundations of data ecosystems, particularly the typology emphasizing orchestrated data ecosystems, the discussion follows to the concept of data orchestration.

2.3 Data Orchestration

Data orchestration, as defined in this study, is based on Resource-Orchestration Theory (ROT) and refers to the strategic coordination of data-related resources, actors, and processes to generate value within a data ecosystem (Salerno & Maçada, 2024b; Zhang *et al.*, 2022). Rather than focusing on the technical automation of data flows, as seen in IT-based data orchestration, this perspective emphasizes how organizations structure, bundle, and leverage data resources to improve decision-making and policy implementation (Schreieck *et al.*, 2022; Queiroz *et al.*, 2020). This approach is particularly relevant in data ecosystems, where multiple stakeholders interact through shared data infrastructures. In such environments, orchestration helps to align goals, foster collaboration, and address common challenges—such as data fragmentation and lack of interoperability (Guggenberger *et al.*, 2020).

Within the framework of ROT, the processes of structuring, bundling, and leveraging are interdependent elements that enable value creation from data (Schreieck *et al.*, 2022). Structuring in data orchestration involves identifying, organizing, and allocating resources to ensure that data is accessible, relevant, and aligned with objectives (Queiroz *et al.*, 2020). Bundling refers to integrating and combining complementary data sources, enabling interactions among different information sources and systems. Leveraging denotes the strategic use of these resources to achieve organizational or collective goals within the data ecosystem (Salerno & Maçada, 2024a; Lin *et al.*, 2023).

These three processes, when coordinated effectively by an orchestrator, foster the ecosystem's dynamism, enhancing the strategic potential of data while strengthening value creation capabilities (Cui & Han, 2022; Schreieck *et al.*, 2022). Based on these assumptions, data orchestration comprises four primary dimensions: data strategy, data governance, synergy, and technological infrastructure. The selection of these dimensions of data orchestration was grounded in the core processes of ROT (structuring, bundling, and leveraging) and informed by empirical studies on data orchestration in digital and public ecosystems (Schreieck *et al.*, 2022; Cui & Han, 2022; Queiroz *et al.*, 2020). These dimensions are explored in detail in subsequent sections.

2.3.1 Data Strategy

Data strategy refers to a plan that guides how data will be used to achieve organizational objectives, setting priorities, guidelines, and promoting alignment between organizational goals and data, thereby integrating data into decision-making processes (Gür *et al.*, 2021; Marr, 2021). According to Vayyavur (2024), an effective data strategy requires not only planning for data use and related objectives but also alignment among stakeholders. In the context of orchestration, focusing on specific informational resources is important to explore the effects of integration and strategic coordination (Zhang *et al.*, 2022). This alignment is particularly relevant in public institutions where the common goal is to deliver services to the population.

In this context, data strategy becomes particularly important due to the complexity of interactions among different actors, aiming to guide how goals and objectives can be achieved through data (Schreieck *et al.*, 2022; Curry *et al.*, 2021). From this perspective, data orchestration is relevant for spreading and amplifying the benefits of a data strategy, enabling ecosystem participants to act collectively towards achieving objectives (Queiroz *et al.*, 2020). Orchestration facilitates the integration of efforts, enhancing the generation of value through data exchanges within the ecosystem.

As Gür *et al.* (2021) indicate, data strategy encompasses dimensions such as strategic declarations, internal and external data sources, ecosystem alignment, and strategy implementation. Through this lens, data orchestration leverages data strategy to promote alignment on how data contributes to achieving goals and objectives, establishing it as a central element of data orchestration by directing actors to work cohesively. Therefore, data strategy is adopted as one of the dimensions of data orchestration.

2.3.2 Data Governance

Data governance serves as a foundation for data orchestration by establishing norms, policies, and practices governing ecosystem data, widely recognized as a key element for maximizing the value of data within ecosystems (Lis *et al.*, 2023). Abraham *et al.* (2019) define data governance as a set of processes necessary to ensure that data is handled reliably and complies with legal and institutional requirements. According to Otto *et al.* (2011), data governance not only regulates the use of information but also maximizes its value by defining roles, authorities, and decision-making structures.

In this sense, Kim and Cho (2019) highlight that data governance enhances data strategy by setting the conditions needed to achieve proposed objectives. Thus, data governance integrates ecosystem actors by defining guidelines that promote collaboration among stakeholders and alignment regarding data-related practices. This interaction is particularly relevant in collaborative environments, such as the Judiciary, where clear role definitions and data quality assurance are fundamental to collective success (Salerno & Maçada, 2024b).

The literature explores the role of data governance as a facilitator for orchestration in ecosystems. Lin *et al.* (2023) argue that governance is fundamental for ensuring the proper flow of data within ecosystems, while Schreieck *et al.* (2022) add that orchestrators can leverage governance at three mechanisms—structural, procedural, and relational—to optimize this flow. The orchestrator adapts governance rules to accompany ecosystem transformations. This implies not only proposing new guidelines but also continuously reevaluating existing mechanisms to ensure that the ecosystem remains efficient, collaborative, and capable of generating value in a dynamic environment.

From the perspective of Resource-Orchestration Theory, governance establishes conditions for ecosystem actors to utilize their partners' data integrally, defining clear boundaries about what can or cannot be shared. Therefore, data governance emerges as a dimension of data orchestration by enabling ecosystem actors to understand their responsibilities and desired standards, establishing norms, policies, and practices for ecosystem data.

2.3.3 Synergy

Synergy is one of the core dimensions of data orchestration, reflecting the ability to align and integrate various actors within a data ecosystem to achieve outcomes that exceed the sum of individual contributions (Fredriksson & Hagberg, 2023). Guggenberger *et al.* (2020) argue that synergy is a fundamental element in complex ecosystems, enabling strategic collaboration and effective sharing of informational and technological resources. In data orchestration, synergy promotes the integration and alignment among actors, information flows, and technologies comprising the ecosystem. Thus, data orchestration relies on synergy to foster a cohesive environment and alignment in data-related initiatives.

The literature emphasizes that synergy does not occur spontaneously, requiring deliberate efforts for its development. Lin *et al.* (2023) stress that elements such as trust and effective communication are important for maximizing collaboration among actors. Zhang *et al.* (2022) argue that synergy involves aligning contributions and efficiently integrating resources, enhancing collaboration among stakeholders. This perspective links synergy with other dimensions of data orchestration, such as data governance, data strategy, and technological infrastructure, creating a complementarity that optimizes value generation. By encouraging data sharing and integration among actors, synergy enables the use of advanced data analysis tools, such as big data and artificial intelligence, thereby generating value through data (Vafaei-Zadeh *et al.*, 2020).

In summary, synergy as a dimension of data orchestration is instrumental in fostering collaboration among actors, technologies, and data flows within the ecosystem. Its integration with other dimensions (data governance, data strategy, and technological infrastructure) reveals its importance in creating a cohesive and aligned environment necessary for effective orchestration. By facilitating the complementarity of informational resources, synergy enhances the value of ecosystem data.

2.3.4 Technological Infrastructure

Technological infrastructure can be defined as the set of systems, platforms, devices, and networks that support data collection, storage, processing, and sharing within ecosystems (Otto *et al.*, 2019). According to Chiang *et al.* (2023) and Sirmon *et al.* (2011), technological infrastructure supports and enables orchestration processes by connecting resources, systems, and actors, facilitating integration. From the perspective of data orchestration, technological infrastructure acts as an enabler that integrates different data sources and systems.

Otto *et al.* (2019) emphasize that the interoperability provided by technological infrastructure is vital for data to flow seamlessly within ecosystems. Furthermore, technological infrastructure supports the implementation of standards defined by data governance, ensuring, for instance, consistent data storage and quality standards (Solomonides, 2023). It also offers the flexibility necessary to adapt to changes in data ecosystems, accommodating increases in data volume and complexity. Garg *et al.* (2018) and Ranjan *et al.* (2017) highlight that scalability is a fundamental attribute of technological infrastructure, allowing ecosystems to expand their capacities as new technologies and demands emerge.

Finally, Vafaei-Zadeh *et al.* (2020) stress that technological infrastructure supports data integration, enabling diverse applications and creating conditions to maximize the value of data. Thus, technological infrastructure becomes a core dimension of data orchestration by facilitating the wide use and sharing of data among ecosystem actors (Zhang *et al.*, 2022; Otto *et al.*, 2019).

3. Contextualization to the Brazilian Judiciary

The Brazilian Judiciary comprises a diverse structure, including superior, federal, state, and district courts, designed to ensure the independence and autonomy as outlined in the 1988 Federal Constitution (Brazil, 1988).

While this multiplicity is necessary to address the specificities of various jurisdictions, it also poses challenges related to data integration, process standardization, and administrative efficiency (Barreto & da Costa, 2020).

In this context, the National Council of Justice (CNJ) acts as the orchestrator of the judicial ecosystem, fostering administrative uniformity, establishing guidelines, and monitoring court performance (CNJ, 2023). Reliable and high-quality data are necessary for the CNJ to perform its functions effectively, motivating its role as the data orchestrator of this ecosystem (CNJ, 2009). Key CNJ initiatives involving orchestrated data include DataJud, the Judiciary Digital Platform (PDPJ), and the Justice 4.0 Program, which illustrate the application of data orchestration principles in the judicial ecosystem.

For instance, DataJud centralizes data from all Brazilian courts, creating an integrated database for analyses supporting administrative decisions and public policies. Meanwhile, the PDPJ promotes collaborative development among courts to offer multiservice solutions utilizing shared resources and collaborative tools within the judiciary. Finally, the Justice 4.0 Program incorporates emerging technologies like artificial intelligence and big data into judicial management, aiming to optimize procedural workflows and modernize service delivery (CNJ, 2022, 2023; Vivian, 2020).

By linking these CNJ-led initiatives with the theoretical concepts, important intersections with Resource-Orchestration Theory emerge, motivating further exploration of data orchestration in the judicial ecosystem, particularly through the four dimensions representing data orchestration (data strategy, data governance, synergy, and technological infrastructure). Regarding data strategy, CNJ initiatives outline objectives to be achieved through data, such as creating dashboards with quality information on court activities (CNJ, 2020). For data governance, it is observed that it manifests primarily through CNJ resolutions, such as Resolution No. 331/2020, which provides norms and guidelines for using ecosystem data (CNJ, 2020). Synergy, in turn, can be exemplified by the creation of the Judicial Research Network through Resolution No. 462/2022 (CNJ, 2022), promoting collaboration and alignment among ecosystem actors in data-related initiatives. Finally, technological infrastructure fosters interoperability and data flow among actors, exemplified by the Codex platform, developed to consolidate procedural databases and facilitate data input for technological applications used in the judiciary (CNJ, n.d.).

Therefore, data orchestration within the judicial ecosystem can be observed through the four theoretical dimensions developed under Resource-Orchestration Theory, wherein data strategy, data governance, synergy, and technological infrastructure promote data orchestration to maximize data value. This perspective positions the CNJ as the primary orchestrator of the judicial ecosystem's data, leveraging data resources to meet the ecosystem's and society's demands, as an example of the typology of orchestrated ecosystems (Gelhaar *et al.*, 2021; Oliveira & Lóscio, 2018).

With the contextualization of the judicial data ecosystem understood, the next section presents the methodology used to address the research question: What is the impact of data orchestration on data value generation in the Judicial Data Ecosystem?

4. Research Methods

This section outlines the methodology employed to investigate the proposed research question, focusing on measuring the impact of data orchestration on data value generation. A quantitative approach was adopted, detailed in the subsequent sections, encompassing the development of a questionnaire, its validation, and the statistical techniques applied.

4.1 Development of the Research Instrument

To measure the impact of data orchestration on value generation in the Judicial Data Ecosystem, a survey was conducted with specialists in the judicial ecosystem using a questionnaire. The choice of a questionnaire as a data collection instrument is justified by its ability to systematically and uniformly capture perceptions from the target population (Pinsonneault & Kraemer, 1993). The questionnaire was developed by a multidisciplinary team of researchers and judicial experts with proven experience in managing and analyzing data in the Brazilian Judiciary. The item construction was informed by prior theoretical frameworks, particularly Resource-Orchestration Theory (Zhang *et al.*, 2022), and operationalized through constructs derived from literature on data ecosystems and orchestration (Guggenberger *et al.*, 2020; Schreieck *et al.*, 2022). The final instrument contained 33 items to represent each orchestration dimension (data strategy, data governance, synergy, and technological infrastructure) and data value. Items were designed using a Likert scale of agreement ranging from 1 (strongly disagree) to 7 (strongly agree) to capture the intensity of perceptions regarding the proposed statements. The full questionnaire is available upon request from the authors.

4.2 Face and Content Validity

After the initial draft, a card sorting exercise was conducted with 10 data orchestration specialists to validate the structure and organization of the questionnaire's constructs (Spencer, 2009). The results indicated that the items were consistently organized and aligned with the proposed theoretical dimensions, with minor adjustments made to improve question phrasing. Subsequently, the Content Validity Index (CVI) was calculated based on evaluations from eight experts who assessed the clarity, relevance, and representativeness of the items concerning the constructs, ensuring the instrument's content validity. One item scored below the CVI threshold of 0.8 and was revised for clarity. The remaining items scored above 0.80, indicating an acceptable level of content validity (Alexandre & Coluci, 2011).

4.3 Data Collection

The questionnaire was available from October 15 to December 20, 2024, and distributed to all Brazilian courts and councils via the Judicial Research Network. It was also shared with Judicial Schools, Innovation Laboratories, and IT Departments within courts. A total of 35 responses were received from experts with in-depth knowledge of the judicial data ecosystem, representing segments such as state, federal, labour, and electoral justice, as well as superior courts and councils. Among respondents, 34.2% worked in strategic management, 45.8% in technology, and the remaining 20% in other technical data fields, ensuring broad representation of the Brazilian judicial data ecosystem.

4.4 Instrument Validation

The instrument's validity was assessed using principal component analysis (PCA) to verify the unidimensionality of the dimensions comprising data orchestration (data strategy, data governance, synergy, and technological infrastructure) and data value as constructs. Each dimension was analyzed individually, ensuring significant item contributions. One item (DGP1) scored below 0.7 and was excluded from the analysis (Hair *et al.*, 2019). Internal consistency for the four dimensions of data orchestration and data value was evaluated using Cronbach's alpha, confirming the instrument's reliability. Results are presented in Tab. 1, showing values exceeding literature standards (>0.7), supporting internal consistency (Cronbach & Meehl, 1955).

Tab. 1 - Cronbach's Alpha Result

Dimension	Cronbach's Alpha	
Data Strategy	0.942	
Data Governance	0.952	
Structural		0.943
Procedural		0.924
Relational		0.930
Synergy	0.925	
Technological Infrastructure	0.900	
Data Value	0.966	

4.5 Calculation of Latent Scores

To create a single score per respondent representing data orchestration across its four theoretical dimensions, principal component analysis (PCA) was again applied, extracting scores related to the first component. PCA is a statistical technique for dimensionality reduction that synthesizes shared variance among analyzed items into a reduced set of principal components (Jolliffe, 2002). In this case, the first component, which explained 58.43% of the variance, was selected as the single score to represent data orchestration, summarizing the four theoretically developed dimensions. A similar procedure was applied to the items representing data value, where the first component explained 88.62% of the variance.

4.6 Linear Regression

Using the standardized scores obtained from PCA, a linear regression analysis was conducted to examine the relationship between data orchestration (independent variable) and data value (dependent variable), assessing the significance of the beta coefficient (β) and the percentage of variance explained by the model (R^2). Linear regression is a statistical technique used to identify and quantify relationships between a dependent variable and one or more independent variables, widely used to understand associations between variables (Darlington &

Hayes, 2017). Assumptions of regression analysis (linearity, homoscedasticity, normality of residuals, and overall model fit) were graphically evaluated using R software.

5. Results

This section presents the findings from the methodological procedures performed to assess the impact of data orchestration on data value generation within the judicial data ecosystem.

5.1 Linear Regression Results

Based on the standardized scores obtained through PCA, the regression model results are presented in Tab. 2 and Tab. 3. Assumption diagnostics were graphically assessed in Fig. 1, suggesting that all assumptions were met (Darlington & Hayes, 2017).

The results indicate that data orchestration has a positive and statistically significant impact ($p < 0.05$) on data value ($\beta = 0.687$, $p < 0.001$). Interpreting the coefficient obtained, each additional unit of data orchestration corresponds to an average increase of 0.687 units in data value, based on the standardized scale (mean = 0, standard deviation = 1) derived from PCA (Darlington & Hayes, 2017; Jolliffe, 2002). Tab. 3 reveals that the overall model was significant ($p < 0.05$), explaining a substantial proportion of total variance. The adjusted R^2 value was 0.456, meaning that 45.6% of the variance in data value can be explained by data orchestration. This result indicates that data orchestration has a moderately significant impact on data value (Darlington & Hayes, 2017), aligning with theoretical perspectives presented in Resource-Orchestration Theory (Cui & Han, 2022).

Tab. 2 - Regression Results

Variable	Coefficient (β)	Standard Error	t-Statistic	p-Value
Data Orchestration	0.687	0.127	5.429	< 0.001

Tab. 3 - Analysis of Variance

Source of Variation	Sum of Squares	Degrees of Freedom	Mean Square	F-Statistic	p-Value
Regression	16.04	1	16.04	29.473	< 0.001
Residual	17.96	33	0.544	-	-
Total	34.00	34	-	-	-

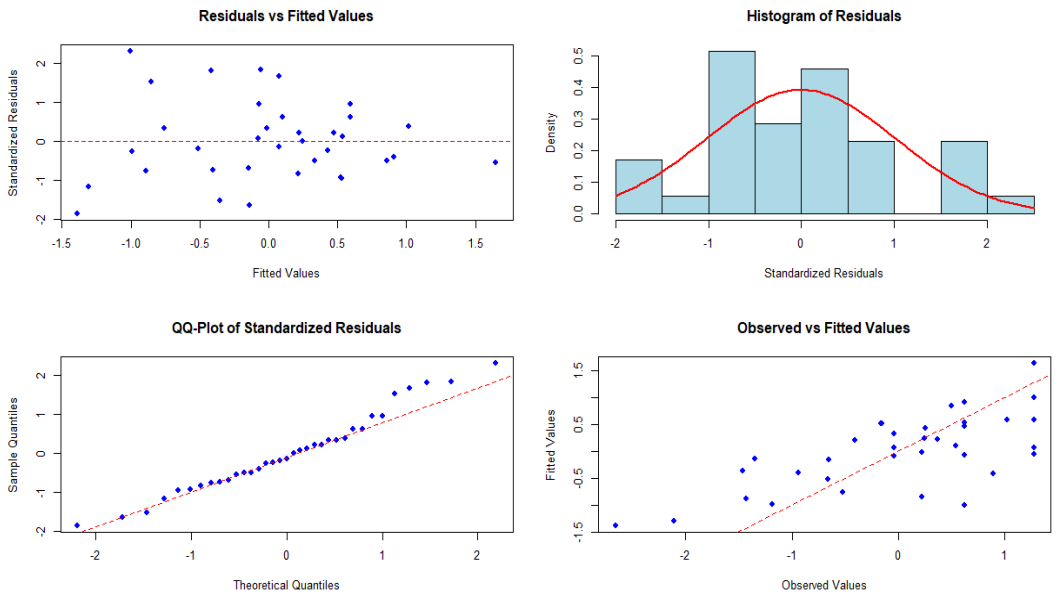

Fig. 1 – Graphical Analysis of Regression Model Assumptions.

5.2 Theoretical Implications

In the theoretical context of data orchestration, the results suggest that the processes of structuring, bundling, and leveraging proposed by Resource-Orchestration Theory can be operationalized through four dimensions: data strategy, data governance, synergy, and technological infrastructure. The leveraging process is represented by the observed increase in data value. These findings corroborate the theoretical framework presented in Section 2, confirming that data orchestration has a significant impact on data value within the judicial ecosystem. This relationship emphasizes the CNJ's role as the ecosystem's orchestrator, coordinating resources, actors, and processes, reflecting orchestrated ecosystems identified in the literature (Gelhaar *et al.*, 2021; Oliveira & Lóscio, 2018).

The results also provide empirical evidence that complements existing literature, contributing to a better understanding of how data orchestration influences data value generation in ecosystems. Addressing the research question directly, the impact of data orchestration on data value generation in the judicial data ecosystem was 0.687, meaning that each additional unit of data orchestration corresponds to an average increase of 0.687 units in data value (standardized scale). Resource-Orchestration Theory suggests that value creation results from the interdependent processes of structuring, bundling, and leveraging resources (Sirmon *et al.*, 2011; Zhang *et al.*, 2022), which, in the context of orchestrated data ecosystems, could be operationalized through data orchestration and its dimensions (Schreieck *et al.*, 2022; Queiroz *et al.*, 2020).

For instance, the impact of data strategy may be increased by strengthening alignment between organizational goals and data practices (Gür *et al.*, 2021), while data governance can evolve through the refinement of procedural and relational mechanisms to better accommodate dynamic ecosystem needs (Schreieck *et al.*, 2022; Lin *et al.*, 2023). Enhancing synergy depends on fostering trust and inter-organizational collaboration (Zhang *et al.*, 2022; Guggenberger *et al.*, 2020). Improvements in technological infrastructure may result from expanding interoperability and scalability to mitigate data fragmentation (Vafaei-Zadeh *et al.*, 2020; Otto *et al.*, 2019). Thus, while the regression model demonstrates the aggregate effect of data orchestration, a conceptual analysis indicates that each dimension has a distinct capacity to influence data value and may require targeted strategies for enhancement.

However, this study was not designed to isolate and test the individual effects of each dimension. While the findings offer initial empirical support for the Brazilian judicial data ecosystem, caution is warranted when generalizing to other institutional or national contexts. Governance structures, data policies, and the degree of central coordination in Brazil may differ significantly from those in other judicial or public data ecosystems. Moreover, the limited sample size constrained the analytical depth, particularly in assessing dimension-specific impacts. Future research with larger and more diverse samples could address these limitations by disaggregating the data orchestration construct and offering a more granular understanding of how each dimension contributes to data value across different settings.

6. Conclusion

Recent technological advancements in the Brazilian Judiciary, particularly the creation of DataJud, have fostered the development of a judicial data ecosystem, presenting opportunities to enhance court management and decision-making processes (CNJ, 2023). In this context, data orchestration has emerged as a strategic approach to optimize data value generation and improve judicial services (Salerno & Maçada, 2024a; Cui & Han, 2022; Schreieck *et al.*, 2022). Through a survey with experts from Brazilian courts and councils, linear regression results revealed that data orchestration positively and significantly impacts data value ($\beta = 0.687$, $p < 0.001$) on the judicial data ecosystem, with the model explaining 45.6% of the variance in data value.

The findings support Resource-Orchestration Theory's emphasis on the role of orchestration in value generation, highlighting the importance of data orchestration in effectively structuring, bundling and leveraging data resources (Lin *et al.*, 2023; Zhang *et al.*, 2022). The dimensions of data strategy, data governance, synergy, and technological infrastructure effectively represent data orchestration, which positively impacts data value generation in the judicial ecosystem, complementing prior studies (Salerno & Maçada, 2024a). These results also reinforce the significance of integration and collaboration among multiple actors to maximize the benefits of shared information in data ecosystems (Fredriksson & Hagberg, 2023; Guggenberger *et al.*, 2020). In addition, the finding aligns with previous studies highlighting the importance of strategic coordination of informational resources in value generation within ecosystems (Autio, 2022; Queiroz *et al.*, 2020).

The significant relationship between data orchestration and data value demonstrates the potential for judicial data ecosystems to adopt orchestration practices as a strategic approach to enhance their operations. By emphasizing coordinated data practices within ecosystems, this study establishes data orchestration as a structured approach to addressing challenges such as fragmented data and inefficiencies in information flow (Guggenberger *et al.*, 2020). This perspective reinforces the growing recognition that ecosystems benefit from orchestration practices

that balance resource alignment with collaborative engagement (Cui & Han, 2022). Furthermore, the judicial context call attention to the unique contribution of these practices in supporting public policies aimed at enhancing service delivery and accountability (Vivian, 2020). These insights provide a foundation for further exploration of how data orchestration can address challenges beyond the judiciary, particularly in data ecosystems where coordination among stakeholders is critical.

In summary, this research demonstrated the significant impact of data orchestration on data value generation, contributing to the academic understanding of how coordinated data practices enhance value creation within data ecosystems. While the research achieved its objective, it faced certain limitations. The primary limitation was the restricted number of respondents, which constrained the application of more advanced statistical techniques and limited the generability of the findings. Subsequent studies could address these limitations by incorporating larger sample sizes, exploring the applicability of data orchestration in diverse ecosystems, or employing advanced quantitative methodologies, such as PLS-SEM, to further validate and refine the construct. These efforts would offer deeper insights into the role of data orchestration in enhancing data value within ecosystems.

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