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Data Governance for Businesses: Challenges, Recommendations, and Critical Success Factors

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Abstract Data governance is the set of roles, processes, policies, and tools that ensure data quality throughout its lifecycle and appropriate usage across an organization. Data governance (DG) empowers users to locate, prepare, utilize, and disseminate dependable datasets independently. This study aims to reveal the challenges that businesses may encounter in the data governance process, propose recommendations, and highlight the critical success factors (CSFs) for data governance. The study's method is qualitative research. Interviews were conducted with 12 experienced volunteer participants in data governance. The data collected from the interviews were analyzed using descriptive and content analysis. The study revealed that the main challenges encountered were a lack of understanding of the impact of the data governance process on other business processes, the complexity of the process, and the role of the process manager. The study revealed that these challenges can be mitigated with effective communication, a clear demonstration of the contribution of the data governance process to the business, and leadership support. Furthermore, the study identified 20 critical success factors for DG success. These CSFs are classified into four categories: organization, people, data and technology, and regulations. As a result of the study, suggestions for businesses, managers, and individuals regarding data governance are presented.

Keywords Data Governance · Data Governance Challenges · Recommendations for Data Governance · Data Governance Success' Critical Success Factors · Qualitative Research Method

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Introduction

Data governance (DG) involves making decisions and exercising authority over data-related matters. It includes establishing and applying policies, procedures, and standards to ensure proper management and use of an organization's data assets. This includes defining roles and responsibilities for managing data, setting benchmarks for data quality, and complying with regulatory obligations (Khan et al., 2018; McMahon & Howe, 2018). DG is the set of decisions, processes, standards, policies, technologies, and other resources necessary to effectively manage, maintain, and utilize information as an organizational asset (Cheong, & Chang, 2007). In another definition, data governance is the process by which a company manages the quantity, consistency, availability, security, and accessibility of its data (Newman & Logan, 2006). Effective DG requires a holistic approach that encompasses both information technology (IT) and DG. The governance of IT provides the decision-making framework that links IT strategy and operations with organizational goals and objectives. On the other hand, DG ensures that data assets are effectively managed and utilized, focusing on meeting the needs and expectations of data consumers. Organizations must prioritize data quality management and consider data quality as a strategic asset. This includes establishing policies, processes, and tools to manage the data quality, concerning meeting the needs and expectations of data consumers. By doing so, organizations can ensure that their data is accurate, complete, consistent, and timely, leading to improved decision-making, increased productivity, and better business outcomes.

Effective DG is crucial for organizations to realize their strategic targets and maintain a competitive advantage in a data-driven business environment. The absence of effective data governance can result in the isolation of data in silos, data inconsistencies, and compliance issues (Oshiro, 2020). Therefore, organizations must develop and implement a comprehensive data governance framework that addresses critical success factors, like quality, ownership, and data security (Khan et al., 2018). Organizations must prioritize data governance to guarantee that data assets are effectively managed and used in support of business objectives. Achieving this requires a thorough data governance framework that addresses the key factors for success. It is crucial to recognize that data governance is a continuous process requiring ongoing monitoring and enhancement to adapt to evolving regulatory demands and business needs.

A well-designed data governance structure is crucial for organizations to manage and use their data assets effectively, and this requires delineating clear roles and responsibilities, emphasizing collaboration, and communication. To achieve this, organizations should establish a comprehensive data governance structure, consisting of a council for strategic decision-making, stewards for data quality management and meeting data consumer expectations, custodians for managing technical aspects such as storage and security, and an office for overseeing the entire data governance program in alignment with organizational objectives. By implementing such a structure and ensuring that all stakeholders comprehend their obligations, organizations can optimize data management to enhance decision-making, heightened efficiency, and better business outcomes. In the evolving landscape of organizational data management, the effective implementation of DG programs has emerged as a critical concern (Alhassan et al., 2019).

The literature review reveals a limited number of studies on data governance in Turkey. The first study was conducted by Kayrak in 2013, titled "Information Technology Governance." The study's findings indicated that organizations with effective IT governance, able to respond to corporate needs, will gain a competitive advantage over other institutions within their sector. Another study is a master's thesis, in which Karındaş (2019) proposed a data governance framework for the banking sector. The study aims to inform those who want to learn how to follow a path and what to do in the data governance creation and implementation

processes. A recent master's thesis on the banking sector used a special "Data Management Scale" survey to assess a bank's data governance practices and its employees' perceptions. The study found that the Kuveyt Turk Participation Bank has a solid foundation in data management, but that it needs to keep developing and updating these practices in response to the changing technological and regulatory environment (Çiçek, 2024). It is also observed that there is a lack of research in the literature on the key factors that ensure the success of data governance in Turkey. This study aims to identify the potential challenges and CSFs for implementing data governance programs in businesses. By identifying CSFs and barriers, this research advances the academic understanding and provides practical insights for organizations seeking to succeed in the complex world of data governance. The findings of this study are significant for businesses seeking to develop their data governance strategies and align them with ever-evolving technological and organizational demands.

The study has four main research questions, which are as follows:

1. What are the participants' views on data governance and its constituent elements?
2. What challenges are encountered in the data governance process?
3. What are the CSFs in implementing a data governance program?
4. What are the recommendations for successfully implementing a data governance program?

The scarcity of studies on CSFs of data governance in the foreign literature and the significant gap in Turkish research in this area highlight the novelty of this study. This research bridges this gap by combining information collected from interviews with professionals working in this sector with the researcher's own experience and interpreting it. This study is expected to be a valuable resource for businesses or individuals planning to implement data governance in the future. It is also intended to help organizations anticipate potential challenges and implement proactive measures to address them effectively. The study also aims to contribute significantly to the literature in this area by providing valuable suggestions for institutions, individuals, and managers.

Literature Review

Critical success factors are essential elements in nearly every business line, facilitating success. In other words, the critical success factor (CSF) can be defined as the key strategies that must be considered to achieve success. The determination of CSFs is the responsibility of the organization's managers or the initiative. Managers help determine the factors organizations need to achieve their goals and strategic plans. Managers consider the most important factors in the organization's operation when determining the critical success factors. Similarly, it is essential to understand the critical success factors of the data governance process, which is a crucial aspect of business operations in the modern era.

As a result of the literature review, it was seen that the critical success factors for the successful implementation of data governance studies included in the literature are as follows: roles and responsibilities (Alhassan et al., 2019a; Mahanti, 2018; Panian, 2010), competencies (Alhassan et al., 2019a; Mahanti, 2018), partnership (Dember, 2006; Ladley, 2012; Luftman, 2004; Mahanti, 2018; Thomas, 2005; Wong et al., 2022), change management (Ladley, 2012; Mahanti, 2018), sponsorship (Mahanti, 2018; Panian, 2010), approach (Mahanti, 2018), KPI and tracking (Mahanti, 2018), business strategy (Mahanti & Mahanti, 2021), and technology (Alhassan et al., 2019a; CDI Institute, 2006; Khatri & Brown, 2010; Larkin, 2008; Panian, 2010; Reeves & Bowen, 2013; Tallon et al., 2013; Tallon et al., 2013; Watson et al., 2004). As a result, when the related studies were evaluated, five basic critical success factors for data governance emerged. They are senior

management support, roles and responsibilities, sponsorship, partnership, and technology. One of the most important factors is senior management support and involvement, as without it, the program is unlikely to succeed. As Sun and Zhao (2015) noted, "*Senior management support is essential to the success of data governance. Without it, the data governance program is unlikely to have the necessary resources, funding, and visibility to make a significant impact*" (p. 56). Another critical factor is the establishment of clear policies and procedures for data management, which must be communicated effectively to all stakeholders. As Kwon and Johnson (2013) pointed out, "*The development of clear policies and procedures is important to ensure that data is managed effectively and efficiently and that all stakeholders understand their roles and responsibilities in the data governance process*" (p. 23). In addition, the availability of high-quality data is also crucial to the success of data governance initiatives. As stated by Strong et al. (2014), "*Data quality is the foundation of data governance. Without it, decisions will be based on inaccurate or incomplete information, which can lead to serious consequences*" (p. 19). The comprehension and acknowledgment of data governance's business value by senior-level management is imperative for the success of such initiatives. Data governance programs must originate and receive backing from the upper echelons of management within business units, as these units typically bear the responsibility for data governance. Senior executives must perceive data not just as a resource but as a strategic asset, warranting their sponsorship and active support for data governance programs (Panian, 2010; Soini, 2024).

Sponsorship is a critical component of DG as another CSF, as companies and government organizations strive to achieve their data governance goals. The sponsor plays a vital role in the board of directors for any project, program, or portfolio. The sponsor is responsible for ensuring that the work is managed effectively and that the objectives are delivered in a manner that meets the identified needs. Additionally, the sponsor plays a critical role in DG, specifically in achieving the data governance objectives of the business. Their primary responsibility within the DG process is to align it with the business goals, strategy, and objectives and to ensure that it is initiated and executed in a manner that aligns with these goals. They also manage risks and changes while maintaining the security of the DG process (Mahanti, 2018).

Another critical success factor for data governance is clear roles and responsibilities. To enhance accountability and operational efficiency in DG endeavors, it is advisable to establish and communicate roles and responsibilities from the outset, as DG activities encompass decision-making and design processes before technical operations (Alhassan et al., 2019a). Wende and Otto (2007) pointed out that defined roles and responsibilities for data governance are at the heart of successful data governance. It is essential to delineate roles, responsibilities, and decision-making authority across various levels, from operational to executive, concerning business, organizational, and technical facets, ensuring proper segregation of duties is established (Mahanti, 2018). Data governance impacts organizational operations, responsibilities, and activities beyond technical aspects; therefore, the human factor is paramount. It is crucial to define procedures, roles, and responsibilities related to data at all levels within the organization and ensure informed participation. Identifying individuals responsible for day-to-day data quality issues or granting strategic authorization for system acquisitions is critical in both strategic and operational data governance activities (Alhassan et al., 2019a). Data stewards and owners emerge as catalysts for driving change, assuming pivotal roles encompassing data quality, data dictionary management, change management, and more. Given that data governance includes a range of roles and responsibilities, it requires a diverse mix of skills, expertise, and knowledge. This diversity is crucial for the successful implementation of data governance initiatives. Essential skills include soft skills such as communication, persuasion, and organizational abilities, as well as technical skills like understanding of data, data quality, and data lineage (Mahanti, 2018). Employee data

competencies are indeed regarded as CSF because of the direct role employees play throughout the data lifecycle, which begins with data entry and encompasses various data governance activities.

Since data governance spans multiple areas within the organization, partnerships between different teams can be another critical success factor. Business units have the responsibility for data, making the management of data governance programs primarily the responsibility of business units and not IT units themselves (Thomas, 2005). IT units, on the other hand, are responsible for governing the IT infrastructure that supports the business's objectives (Luftman, 2004). Thus, a partnership between these sides is necessary to achieve the organization's goals (Dember, 2006). Data governance applies to all business units within the enterprise that interact with data, including those involved in inputting, managing, storing, and analyzing it. To achieve success, stakeholders from all these areas must be engaged and persuaded of the benefits that data governance can offer, which will help minimize resistance to change (Mahanti, 2018). For successful data governance activities, the involvement of teams from different backgrounds, their collaborative efforts, and progress aligned with set targets are crucial, in addition to the framework of roles and policies (Wong et al., 2022). Data stewardship plays a vital role in data governance implementation, as it brings together team members from diverse backgrounds and must be established to go beyond the framework. Therefore, fostering partnerships is crucial for effective data governance (Wong et al., 2022).

Another critical success factor is technology, which plays a key role in implementing data governance programs, particularly in areas such as data integration, reporting, and data quality (Cohen, 2006). These subparts require a technological perspective in their execution. Data governance encompasses technology and human aspects, as each component is interconnected. The implementation of data governance aims to enhance decision-making mechanisms, improve the efficiency of data-related operations, ensure compliance with data regulations, and promote data literacy. To achieve these goals, technology should be widely utilized, as it is inherently linked to the data objectives. Organizations, as noted by Alhassan et al. (2019a), invest in suitable IT infrastructure for data governance implementation. Indeed, there is a wide array of data governance tools available, and the selection of these tools should be based on their inherent capabilities, their ability to integrate with existing systems, and their suitability for meeting specific business needs and cases. Notable examples of companies offering diverse data governance tools include Collibra, Informatica, IBM, Oracle, SAP, and Microsoft, each with their unique offerings in this domain (Mahanti, 2018).

Apart from implementing technology in the implementation of data governance, tracking the measurement of the whole program plays a crucial role in its success. Measurement is significant for assessing the effectiveness of data governance implementation and its management. Although capturing and reporting metrics may seem challenging, it is important to define and establish a process for this purpose (Mahanti, 2018). The application approach is crucial. Data governance, as a living process and approach, should have a long-term structure that changes and updates over time. Thus, the data governance application becomes a repetitive structure and easily escapes the "one-time project" structure. This increases the success of data governance implementation (Mahanti, 2018). Therefore, these CSFs should be carefully considered and addressed in any data governance program to ensure its success.

A review of the literature shows a lack of studies on data governance in Turkey, with a few exceptions (Çiçek, 2024; Karındaş, 2019; Kayrak, 2013). There is also a lack of research on the CSFs of data governance in Turkey. The literature review revealed a gap in the research on data governance in the Turkish business context. This study addresses this gap by investigating the challenges, solution suggestions, and critical

success factors faced by businesses in Turkey in the data governance process. This study will guide businesses that either have implemented or will implement data governance programs in Turkey.

Methods

In this section of the study, the research method, participants, the data collection tool, the data collection process, the data analysis, and the validity and reliability of the study are presented.

Research Method

The qualitative research method was used in this research. The objective of utilizing this methodology is to obtain insights into the experiences and challenges encountered by individuals during their involvement in data governance processes and to identify the critical success factors that contribute to effective data governance practices. This study, which tries to understand the perspectives of the employees working in the different sectors to determine their experiences and challenges, is phenomenological research, one of the qualitative research methods designed and aims to reveal the essence of the person's perception of their experiences.

Participants

The participants in the study were selected using criterion sampling, one of the purposeful sampling methods. Purposive sampling is a random sampling method in which the sample group is targeted to have specific characteristics. This method can be used in many populations, but is more effective with a smaller sample size and a more homogeneous population (Patton, 2002). The purposive sampling method was preferred because researchers had a clear idea about the characteristics they wanted to examine and because they wanted to select a sample that represented these characteristics. The participants in the study were individuals with professional experience who had taken part in data management programs/projects. The criterion sampling method was preferred to determine a specific importance criterion. The study's criteria were that the participants were required to have participated in a data governance program's implementation and to reside in Istanbul. The study's eligible participants are 12 employees of eight firms in Istanbul, namely automotive, insurance, consulting, banking, and energy production, who have been involved in the data governance program implementation.

The participants in this study were voluntarily involved in the research. Before the interviews, the participants were provided with comprehensive information regarding the study's objectives and potential benefits. Each participant was asked to sign an informed consent form, indicating that they had chosen to participate voluntarily and without any external influence. Additionally, the form stated that their involvement in the study was entirely optional and that they could withdraw from the study at any time without consequence. No personal information was requested from the participants. Each individual was assigned a code, ranging from P1 to P12.

Data Collection Instrument

To gather data for this study, a semi-structured interview form was developed as the primary data collection instrument. Interviews are the most commonly used data collection tool in qualitative research. Patton (1997) emphasizes that the purpose of the interview is to explore an individual's inner world and understand their perspective (Patton, 1997. p. 108). Bailey (2007) outlined the following strengths of the

interview method: flexibility, high response rate, non-verbal behaviors, control of the environment, question order, immediate responses, completeness of information, and in-depth insights.

The draft version of the interview form was created based on the review of relevant literature and the researcher's own experience. The draft form was updated based on feedback from five different experts to create the final version. To make the interview form more efficient and consistent, expert opinions were sought from professionals who have worked in the field of data governance and gained experience in this domain across different companies and industries. These experts are highly educated in their respective fields, hold high-level positions in their organizations, and have multiple project experiences in the DG field. The experts' demographic information has been presented in Table 1.

Table 1

Demographic information of the experts

Expert Code	Gender	Age	Education Level	Sector	Working Experience (years)	Data Governance Experience (years)
E1	Male	33	Master's degree	Automotive, Banking	11	4
E2	Female	30	Master's degree	Automotive, Consultancy, and Banking	8	5
E3	Female	26	Bachelor's degree	Consultancy	3	3
E4	Male	32	Bachelor's degree	Consultancy, Insurance, Telecom	10	8
E5	Male	40	Doctoral Degree	Consultancy, Banking, Stock Market, University	18	9

Table 1 indicates that the experts have an average of 10 years of working experience and 5.8 years of experience in data governance.

The draft interview form consisted of 22 questions, including six questions about the participant's demographic information and 16 questions about the data governance domain. Table 2 shows the number of questions before and after the expert opinions.

Table 2

Number of questions before/after expert opinions

Section No	Section name	# of Questions before expert opinions	# of Questions after expert opinions
1	Demographic Information	6	7
2	Basics of DG	7	4
3	Challenges Encountered	5	3
4	Critical Success Factors and Suggestions	4	2

Upon examination of Table 2, a new question was added to the participant information section. However, it was also observed that questions were withdrawn from the other three sections. Furthermore, the experts were requested to provide an overall assessment of the interview form questions. The experts offered feedback that the interview form is "valuable, impressive, scope-expanding, and enriching." Before the expert opinions, the total number of questions was 22. Following the expert opinions, the total number of

questions decreased to 16. Seven questions sought demographic information about the participants, while 9 questions were about the data governance area (Table 2).

The questions in the interview form have three main sources: literature, experts, and researchers. Table 3 illustrates the distribution of questions according to their sources.

Table 3
Source distribution of the questions

Section No	Section name	# of Questions	# of Questions from the Literature	# of Questions from Experts	# of Questions from Researchers
Section 1	Demographic Information	7	4	1	2
Section 2	Basics of DG	4	2	1	1
Section 3	Challenges Encountered	3	1	1	1
Section 4	Critical Success Factors and Suggestions	2	1	1	-
Total number of questions: 16					

The interview form comprises four sections (Table 3). The first section of the interview form consists of seven questions about the participants' demographic information (age, gender, education level, area of expertise, employment sector, work experience, and experience in data governance). The second section contains four questions about the basics of DG. The third section has three questions regarding the challenges encountered with DG. Finally, the fourth and last section has two questions about the critical success factors and suggestions.

Data Collection Process

The data collection process for this study was approved by Ankara Yıldırım Beyazıt University Ethics Committee Approval (03-46), which was obtained from the Ethics Committee to conduct the research. The decision of the ethical committee was obtained on March 15, 2023/, with reference number (03-46).

The researcher conducted interviews from April 14, 2023, to May 30, 2023. Face-to-face interviews were organized and conducted with participants at prearranged locations, following the prior scheduling of appointments. Half of the interviews were held in online environments such as Zoom, Google Meet, and Microsoft Teams sessions because of the distance between the participant and the researcher. The interviews lasted an average of one and a half hours and were conducted at the participants' request. The participants were interviewed in a face-to-face setting in their respective offices in Istanbul, and online interviews were conducted via Zoom, Google Meet, and Microsoft Teams sessions.

Data Analysis

This study used descriptive and content analysis techniques to analyze the data collected from the interviews. Descriptive analysis is the summarization and interpretation of data within the framework of the determined themes (Patton, 2018; Yıldırım & Şimşek, 2016). A descriptive analysis comprises a summary of the data in question. It is based on predetermined themes, supported by direct quotes.

Content analysis consists of examining research data, generating codes from the data, determining themes, creating thematic networks, ensuring the integrity of the themes and interpreting them (Miles &

Huberman, 2016; Robson, 2017). The conceptual framework obtained from the literature review was used in the content analysis. Responses were grouped according to the framework, and various themes and categories were determined. Similar data were clustered to form specific concepts, which were then interpreted accordingly. In general, this analytical process facilitated the researcher to grasp the interview data more deeply and draw meaningful conclusions.

Validity and Reliability

To ensure the validity and reliability of the study, the following approaches were adopted:

- The preparation of the interview questions was based on individual experiences, which served as a foundation. Subsequently, the questions were enriched with an academic and literature-based perspective by examining commonly used frameworks in DG.
- To enhance the reliability and diversity of the interview questions, experts with varying levels of expertise from different sectors and backgrounds were consulted. Their feedback was incorporated, and necessary adjustments were made to the data collection process.
- The participants were randomly selected from different sectors and companies. The study prioritized validity and accuracy by including participants with various levels and disciplines, thus obtaining a representative and generalizable working group.
- The interviews were conducted online or in person based on the participant's preferences and convenience.
- Before the interviews, the participants were given information to ensure they understood the study. They also exhibited adherence to the principles of voluntariness and confidentiality.
- After the interviews, the interview transcripts, a document comprising their responses to each question, were shared with the participants to obtain confirmations to ensure accuracy and validation.

The participants in the study were thoroughly informed about the researcher's identity, the purpose of the research, how and where the information gathered will be used, and the voluntary nature of their participation. They were also informed that they had the right to withdraw from the study at any stage. This comprehensive approach ensures ethical rigor and informed consent in the research process.

Results

This section consists of two subsections. In the first subsection, the findings regarding the demographic characteristics of the participants are presented. In the second subsection, the participants' responses to the questions in the interview form were analyzed and presented.

Findings of the Demographic Information of the Participants

The demographic information (age, gender, education level, expertise area, sector of employment, working experience, and DG working experience) of the participants is presented in Table 4.

Table 4

Source distribution of the questions

ID	Age	Gender	Education Level	Area of Expertise	Employment	Working Experience (years)	DG Working Experience (years)
P1	33	Male	Master's degree	Math	Automotive	11	2
P2	38	Female	Bachelor's degree	Informatics	Finance	14	5
P3	25	Female	Bachelor's degree	Computer Eng.	Consultancy	2	2
P4	39	Female	Bachelor's degree	Math	Consultancy	15	4
P5	30	Female	Master's degree	Computer Eng.	Consultancy	8	5
P6	32	Male	Bachelor's degree	Computer Eng.	Consultancy	10	8
P7	32	Female	Master's degree	Math	Banking	8	2
P8	26	Male	Bachelor's degree	Computer Eng.	Consultancy	2	1
P9	40	Male	Doctoral Degree	Statistics	Consultancy	18	9
P10	28	Male	Bachelor's degree	Computer Eng.	Insurance	5	3
P11	44	Male	Master's degree	Data Analytics	Banking	20	5
P12	31	Female	Bachelor's degree	Computer Eng.	Energy	7	1

When analyzing the participants' demographic information (Table 4), it was observed that there was an equal distribution across the "gender" category among the participants. This indicates a balanced representation in terms of gender demographics. It is seen that most participants fall within the 30-39 age range, with a total of seven participants. This indicates a relatively higher representation of individuals in their thirties. Table 4 indicates that the participants' working experience is spread across different ranges. 33% of participants fall within the 5–10 years of experience category. This means a significant representation of individuals with mid-level experience. This comprehensive analysis highlights the multidimensional perspectives and insights provided by participants with varying combinations of working and data governance experience. When Table 4. is examined, it can be observed that most participants, accounting for 50% of the total, have 1-3 years of data governance experience. This indicates a significant representation of individuals with relatively little experience in the field. Additionally, the 4-6 years of experience category comprised 33% of the total participants, demonstrating a significant number of participants with mid-level experience. Lastly, the 7+ years of experience category is represented by 17% of the participants.

Findings of the Interview Questions

The second part of the interview form contains nine questions in three sections. These sections discuss the basics of data governance, challenges encountered, CSFs, and recommendations. The data collected from the participants will be classified according to these three sections, and the analysis results will be presented accordingly.

The second section of the interview form regarding the basics of data governance contains four questions. Participants were first asked for the definition of data governance. Three of the participants' definitions of data governance are as follows:

P1: *"The function carried out to manage, control, and ensure the correct use and sharing of an organization's data assets, thus optimizing business processes, is called Data Governance."*

P3: *"It determines the custodians of the data assets within an institution, ensures that the orphaned assets are appropriated by addressing them to the right people and points, determines the processes, standards, policies, and procedures used in the institution, ensures their traceability and sustainability, and also ensures decision-making on the relevant processes. It is the process cycle in which activities are carried out to ensure that business units can speak the same language."*

P10: *"Data governance encompasses the principles, procedures, and strategies to ensure that organizations can discover and track data, place data accurately in appropriate business processes, and maximize data security, quality, and value."*

Participants' definitions of data governance were examined, and the words used in these definitions and their frequency of use are presented in Table 5. Participants' responses were analyzed based on keywords.

Table 5

Data governance definition's word frequency

Keywords	Participants	Frequency
Management	P1, P4, P5, P7, P8, P10	6
Business Process	P1, P2, P6, P11, P12	5
Classification	P2, P9, P11, P6	4
Data asset	P1, P3, P7	3
Policy	P2, P3, P8	3
Procedure	P3, P9, P10	3
Efficiency	P6, P7	2
Quality	P7, P5	2

Table 5 illustrates that the three most frequently referenced terms in defining data governance among participants were: management, business process, and classification. On the other hand, the definitions were only referenced once in the terms "asset management," "strategy," "common understanding," and "framework." Upon evaluation of the definitions proposed by the participants, it was observed that they were largely compatible with one another. However, the degree of compatibility varied according to the participants' experiences and focus points.

In the second question of this section, participants were asked about the data governance subcomponents they were working on. Thus, this study aims to evaluate the different experiences and perspectives of the participants in this field. In this question, participants were allowed to highlight more than one data governance subcomponent. As a result of examining the subcomponents that the participants worked on in the field of data governance, it was seen that 11 participants worked on the sub-areas of metadata, data quality, and data ownership. These sub-components were followed by data compliance with nine participants and master data with five participants. Notably, the other four areas (content management, data security, data lineage, and data architecture) were addressed by the four participants.

In the third question, participants were asked to rank the subcomponents of data governance according to their priorities. The priority value ranges from 1 to 5 (1: highest priority, 5: lowest priority). Participants were asked to rank the options in this question.

Table 6

DG subcomponents rankings by priority

Subcomponent	1	2	3	4	5
Data architecture	5	3	-	-	4
Data compliance	2	3	4	-	3
Data lineage	2	2	3	4	1
Data ownership	6	1	1	1	3
Data quality	4	3	1	1	3
Data security	4	3	2	-	3
Document and content management	-	2	6	3	1
Metadata	3	4	1	-	4
Reference and master data	3	3	3	1	2

As seen in Table 6, data ownership ranked first, and six participants gave data ownership the highest priority. Data architecture ranked second, while data quality and data security ranked third.

In the fourth question of this section, participants were asked to rank the subcomponents of data governance according to their difficulty (1: highest difficulty level, 5: lowest difficulty level)

Table 7

DG subcomponents rankings by difficulty

Subcomponent	1	2	3	4	5
Data architecture	6	-	2	2	2
Data compliance	2	2	5	2	1
Data lineage	1	2	3	5	1
Data ownership	2	3	2	3	2
Data quality	-	6	2	2	2
Data security	3	6	-	1	2
Document and content management	1	2	3	5	1
Metadata	2	3	4	2	1
Reference and master data	2	2	6	2	-

When Table 7 data governance sub-dimensions are examined in terms of difficulty, it is seen that only data architecture comes to the fore. This is followed by data quality and data security. On the other hand, data quality was not mentioned by any participant at the highest difficulty level.

The third subsection of the interview form regarding data governance contains questions related to the challenges encountered. In this section, the participants were asked three questions. The first question of this section was asked the participants in an open-ended manner. Participants were asked to describe any challenges they encountered in implementing the data governance program and, if so, to explain them. Three participants (P2, P4, P6) stated they did not experience any challenges. Participant 1 also emphasized that no difficulties were encountered due to the support of senior management. Similarly, P11 stated that

as follows: "*Due to the comprehensive IT evaluation consultancy output, it was not difficult to convince the relevant people of the necessity of data governance studies.*" The challenges noted by the other participants are summarized in Table 8.

Table 8

Challenges encountered

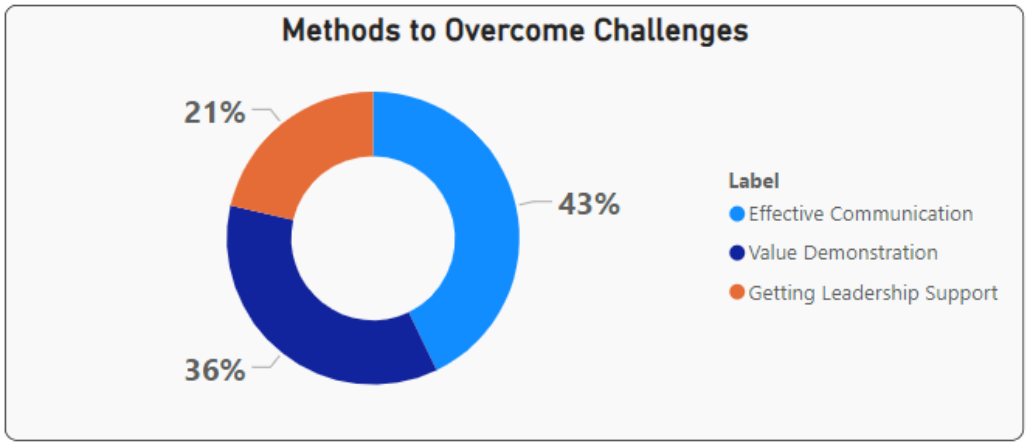
Challenges	Participants	Frequency
Business involvement	P3, P5, P6, P8, P10	5
Complexity	P8, P9, P10, P12	4
Ownership	P9, P12	3
Convince managers	P5, P7	2
Leadership support	P3, P8	2
Technology	P7, P10	2
Continuity	P8	1
DG Framework	P9	1

According to Table 8, the involvement of business units and complexity stand out as the most frequently encountered challenges by the participants.

In the second question of this section, participants were asked how they overcame the challenges they encountered. The participants' responses were analyzed and presented in Figure 1, along with the strategies employed to address these challenges.

Figure 1

Methods to overcome challenges



Upon examination of Figure 1, three methods emerged as effective communication, value demonstration, and leadership support. Of the participants, 43% indicated effective communication, 36% stated value, and 21% stated receiving leadership support as a method.

In the third question of this section, participants were asked to identify any potential challenges they may encounter in the data governance process in the future. They were also asked to provide solutions to these challenges. The response of P4 to this question is as follows: "*It usually starts as a program and stays in focus for a while. However, as time goes by, the flame of the program fades away, and it is observed that there is a sustainability problem. The data is defined and owned, but as time passes, it becomes difficult to keep this*

information alive because it is treated as a finite program." In response to this question, P10 provided the following answer: "*With the constant change of people within the data governance structure in business units, difficulties may arise in ensuring the adaptation of new colleagues.*" Participants indicated possible future challenges such as loss of motivation (P2, P6, P8, P12), security and control (P3, P5, P6, P11), sustainability (P1, P4, P7), staff turnover and shortage (P7, P9, P10), infrastructure and technological requirements (P7, P11), and compatibility (P2, P12). Participants also suggested the following solutions to these future challenges. The solutions suggested by the participants for the challenges that may be encountered in the future are presented in Table 9.

Table 9

The suggested solutions to future challenges

Solutions	Participants	Frequency
Benefit demonstration	P1, P3, P6, P10, P11, P12	6
Senior management support	P1, P2, P5, P9, P10, P12	6
Having good standards	P7, P8, P11, P12	4
Automate the processes	P4, P9, P11	3
Preventing personnel loss	P2, P5, P8	3
Detailed planning	P6, P7, P10	3
Dedicated team	P7, P8, P9	3
Training	P3, P4, P9	3

When the solution suggestions in Table 9 are examined, the first solution is to explain and demonstrate the benefits to be obtained from the DG process. The second solution suggestion expressed by the same number of participants is to ensure the support of the senior management. Standards are in third place, followed by automated processes, detailed planning, training, dedicated teams, and measures to prevent personnel losses.

The fourth section of the interview form regarding the data governance field contains questions related to critical success factors and suggestions. In this section, the participants were asked two questions. In the first question of this section, participants were asked to identify the critical success factors necessary for the successful execution of a data governance program. The following is a list of the CSFs cited by the participants:

- Awareness
- Budget
- Clear DG Processes
- Continuity
- Currentness
- Data management
- Data security
- Data Policies
- Linked DG with Business Results
- Training

- Technology
- Teamwork and collaboration
- Prioritization
- Regulations
- Responsibilities
- Roles
- Scope
- Senior Management Support
- Standardization
- Stewardship

The second question of this section is related to the recommendations. Participants asked for recommendations for a business that would start implementing a data governance program.

Table 10

Recommendations for businesses that will implement a data governance program

Recommendations	Participants	Frequency
Senior management support	All participants	12
Business requirements determination	P1-P10, P12	11
Technology investment	P1-P7, P10-P12	10
Data ownership	P1-P7, P9, P10	9
Key person identification	P1-P3, P5, P8-P12	9
Vision	P4-P7, P9, P10, P11	7
Determination of the KPIs	P6, P7, P9, P10, P11	5
Pilot group selection	P1, P2, P7, P10	4

All responses given by the participants were examined and presented in Table 10. When Table 10 is examined, it can be seen that senior management support, determination of business needs, and technology investment are the most frequently expressed suggestions. Pilot group selection was the least recommended suggestion by the participants.

In the third question of this section, participants were asked to score to what extent the importance of data management is understood by institutions in Turkey, with 1 being the lowest and 10 being the highest.

Table 11

Participants' scores regarding the importance of DG in Turkey

Score	Participants	Frequency
1	-	-
2	-	-
3	P1, P5, P7, P12	4
4	-	-
5	P2, P8, P11	3
6	P3, P4, P6, P10	4

Score	Participants	Frequency
7	P9	1
8	-	-
9	-	-
10	-	-

The scores given by the participants on how important the data governance process is for institutions are shown in Table 11. According to Table 11, none of the participants gave a score of 8 or above. On the other hand, it is seen that the participants did not give a score of two or below. When the average of the scores is taken, it is seen that it is 4.8.

Discussion and Conclusion

In this study, interviews were conducted with participants working in different sectors in Turkey and involved in the data governance process. Questions were asked about the four research questions of the study in the interviews, and the responses of the participants were analyzed.

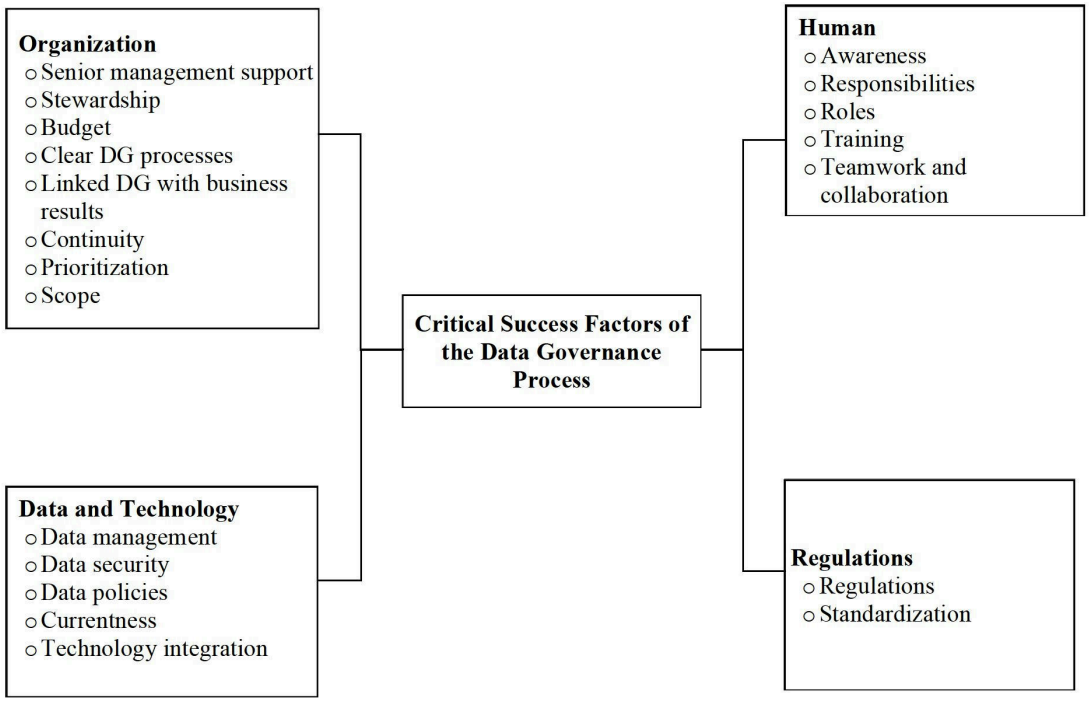
As a result of the study, it was seen that the data governance definitions of the participants were compatible with each other. The difficulties encountered in the data governance process were the participation of the DG process in other business processes, the complexity of the process, and the DG process manager. In addition to these difficulties, the persuasion of managers, senior management support, and technology-related problems were emphasized. It was revealed that these difficulties can be overcome with three methods: effective communication, demonstration of the contribution of the DG process, and leadership support.

Another study's finding is that the average score of the question of understanding the importance of data governance by institutions in Turkey is 4.8. This can be interpreted as the importance of DG being understood by 48%, which is close to the medium level. In other words, it can be said that the importance of data management is not fully understood by institutions in Turkey.

Because of the study, it was seen that there are 20 critical success factors affecting the DG process. These 20 CSFs were grouped under four categories: institutional, data, people, and regulations, and are presented in Fig. 2. When Fig. 2 is examined, it is seen that the categories are institution, data, regulations, and human. It is seen that the most critical success factors are gathered under the institutional category. Therefore, it is important for the institution to be ready for the data governance process and to provide full support. Another important category is humans. Only the managers' requests will not be enough in any process. All employees in the business must be ready for the DG process both mentally and competently. Another category is data and technology, and for the DG process to be successful, technology, data management, data security, data policies, and data to be up-to-date are also required. Another category is human, and no business process can be carried out without humans. Therefore, roles and responsibilities should be clearly defined and, if necessary, employees should be trained. In addition to all these, the process should be carried out by laws and regulations.

Figure 2

Categorization of the CSFs of DG



In parallel with the results of this study, roles, responsibilities, and competencies have been reported in the literature as critical success factors for data governance success (Alhassan et al., 2019a; Mahanti, 2018; Panian, 2010). Partnerships and collaborations between different teams, which are similar to the results of this study, have also been widely mentioned as a CSF for data governance practices and have been expressed in studies as partnership and collaboration (Dember, 2006; Ladley, 2012; Luftman, 2004; Mahanti, 2018; Thomas, 2005; Wong et al., 2022). In a related study, Alhassan, Sammon, and Daly (2019b) conducted a single case study with a major telecommunications service provider in Saudi Arabia to identify CSFs for data governance. The results demonstrated that a business-driven data integration strategy is the most critical success factor.

Senior management support has been reported as CSF by other researchers in the literature (Kwon & Johnson, 2013; Strong et al., 2014; Sun & Zhao, 2015). Senior management support was a critical success factor that was acknowledged by most participants. Senior management support is among the most important success factors in both initiating data governance efforts and successfully transforming the efforts into a sustainable format and disseminating them throughout the organization. The study results also showed that senior management support is the most common obstacle encountered in the DG process. A study with similar results was conducted by interviewing five data experts in the Finnish banking sector. The objective was to identify the critical success factors of DG in the banking sector. The CSFs identified were managing regulatory and financial risk, customer and stakeholder value and business value, senior management support, data ownership, data-centric culture, and business strategy (Soini, 2024). In a separate study, researchers examined the CSFs that affect the success of cloud data governance. The study identified 10 critical success factors for data governance, including strategic accountability, standards, administrative blind spots, embracing the complexities of data, cross-departmental issues, data quality metrics, partnership, strategic control points, education and awareness of data stakeholders, and compliance monitoring.

Although the study investigated cloud data governance CSFs, some CSFs were common to our study (Al-Ruithe, & Benkhelifa, 2017).

This study identified technology, data management, data security, data policies, and data updates as CSFs in the DG process. A literature review revealed that technology or data-related topics, including data quality, integration, data dictionaries, data life cycles, reporting, and root cause analysis, are also critical success factors. Additionally, the integration of technology with the institution's existing systems has been identified as a significant factor (Khatri & Brown, 2010; Panian, 2010; Reeves & Bowen, 2013; Tallon et al., 2013).

Another CSF category seen in this study was human. It is seen that there is no human category in the studies in the literature and this study brings a new perspective to the literature with this result. The human factor has always been a critical factor for the success of information systems. The results of this study also support this. The competencies of employees involved in the DG process are regarded as critical success factors (CSFs) due to the direct role they play in the data lifecycle, which begins with data entry and encompasses various data management activities. Managing tasks such as data entry and data access requires employees to have a basic skill set and a certain degree of awareness to properly handle the organization's data (Alhassan et al., 2019a).

The study participants also provided recommendations for businesses that will implement data governance in the future. These recommendations encompass the following: support from top management, identification of business needs, and investment in technology. It can be reasonably concluded that businesses that want a successful data governance process in the future should consider these three recommendations.

Considering the findings of the study, a series of recommendations can be put forth for consideration by those in managerial roles. It is recommended that senior management provide active support for data governance initiatives. This may entail providing the necessary resources and showing visible support for these endeavors. Defining roles and responsibilities and communicating them to employees is essential to prevent ambiguity and overlap. DG strategies should be aligned with business results, with tasks that provide business impact given the highest priority. A dedicated task force can be established for the DG. It is not advisable to attempt to implement all DG activities simultaneously; instead, a pilot study can be initiated. If necessary, the scope can be expanded to other areas with support. Since DG is a long-term process, it is essential to determine key performance indicators and to closely monitor progress to ensure long-term success.

The following recommendations are intended for organizations that are either implementing or planning to implement a data governance program. It is essential to allocate sufficient budgets and invest in appropriate technology to streamline data management processes. It is essential to develop and implement a long-term vision for success and business engagement within a framework that aligns with the organization's current business strategy. A culture of continuous improvement must be encouraged, and the DG process must be updated based on trends and evolving business needs. It is crucial to invest in the right team or people before embarking on data management initiatives. If necessary, outsource services to an experienced service provider with successful practices in a similar industry.

Those working in the field of data governance can benefit from several suggestions. First, they should be aware of the importance of this issue. Second, they should receive training to maintain their knowledge of the latest practices. Third, they should develop effective collaboration, teamwork and communication skills. Fourth, they should demonstrate the beneficial effects of the DG process to business units and senior

management regularly. Finally, they should receive senior management support to initiate and sustain the process over time.

This study has several limitations. It relies on a relatively small working group and focuses on a limited number of firms that may not fully represent the variety of challenges and practices in DG. To gain a more comprehensive understanding of the field, future researchers could conduct research with a larger, more diverse sample and examine additional aspects such as the impact of cultural differences on DG practices. They could also investigate the long-term effects of implemented DG strategies and their adaptation to rapidly changing technological environments.

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