## UNIVERSIDADE ESTADUAL DO OESTE DO PARANÁ PROGRAMA DE PÓS-GRADUAÇÃO EM ADMINISTRAÇÃO (PPGADM) MESTRADO PROFISSIONAL

# WESTERN PARANÁ STATE UNIVERSITY PROFESSIONAL MASTER'S IN ADMINISTRATION

A relação entre Sistema de Medição de Desempenho, práticas de Gestão de Riscos e Accountability no setor público

The relationship between Performance Measurement System, Risk Management practices and Accountability in the public sector

[TRADUÇÃO INGLESA]

DIEGO SOARES ALVES

CASCAVEL/PR 2024 **Diego Soares Alves** 

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# The relationship between Performance Measurement System, Risk Management practices and Accountability in the public sector

# [TRADUÇÃO INGLESA]

Dissertation presented in partial fulfilment of the requirements for the degree of Master of Science in Administration in the Department of Administration, Western Paraná State University. Dissertation Supervisor: Dr. Vinicius Abilio Martins

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# DIEGO SOARES ALVES

## A RELAÇÃO ENTRE SISTEMA DE MEDIÇÃO DE DESEMPENHO, PRÁTICAS DE GESTÃO DE RISCOS E ACCOUNTABILITY NO SETOR PÚBLICO

Dissertação apresentada ao Programa de Pós-Graduação em Administração em cumprimento parcial aos requisitos para obtenção do título de Mestre em Administração, área de concentração Competitividade е Sustentabilidade, linha de pesquisa Estratégia e Competitividade, APROVADO(A) pela seguinte banca examinadora:



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I dedicate this work to God, for His grace and mercy, which allowed me to get this far. To my wife, whose support, patience and love were essential for me to persist and complete this stage. To my family, for their understanding, encouragement and faith in me. This achievement is also yours.

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#### **RESUMO**

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A gestão do desempenho melhora a eficácia dos serviços públicos e tem impacto positivo nos resultados para os usuários destes serviços. Entretanto, os riscos podem interferir no esforço de uma organização para atingir os seus objetivos. Além disso, a atuação dos órgãos governamentais está sujeita a expectativas que são avaliadas pela accountability, que comumente é associada à ideia de prestação de contas e/ou responsabilização. Este cenário pressiona o setor público a buscar formas de diminuir a ocorrência de irregularidades, descumprimento da regulamentação e má gestão dos ativos do governo, e, para isso, são necessárias ferramentas e estratégias sofisticadas para impor um comportamento administrativo responsável. Esta dissertação teve como objetivo investigar a relação entre o Sistema de Medição de Desempenho, a Gestão de Riscos e a Accountability no setor público. Para cumprir o objetivo, foram adaptadas as medidas de Al-Tamimi e Al-Mazrooei (2007) para captar as práticas de Gestão de Risco, as medidas de Geer et al. (2008) para a accountability, enquanto as medidas para a utilização do Sistemas de Medição de Desempenho foram adaptadas de Henri (2006). Por meio dessas medidas, examinou-se, então, as relações entre o uso do Sistema de Medição de Desempenho e as práticas de Gestão de Riscos, as práticas de Gestão de Riscos e a accountability, e o efeito mediador da Gestão de Riscos na relação entre o uso do Sistema de Medição de Desempenho e accountability. A coleta de dados foi realizada via e-mail, contendo o link para acesso a questionários cadastrados no google-forms. Os questionários da pesquisa foram distribuídos a 287 responsáveis pela Gestão de Risco nos ministérios governamentais, unidades descentralizadas e instituições da administração indireta. A amostra compreendeu 166 respostas válidas, que foram analisadas usando técnicas de modelagem de equações estruturais de mínimos quadrados parciais (PLS-SEM). Os resultados do estudo demonstraram que todas as dimensões do uso do Sistema de Medição de Desempenho têm efeitos positivos significativos em diferentes dimensões das práticas de Gestão de Riscos. Ao testar a relação entre as práticas de Gestão de Riscos e a accountability, indicou que a avaliação dos riscos tem um efeito positivo significativo na accountability. Além disso, mediou a relação entre os tipos de uso do Sistema de Medição de Desempenho (monitoramento e foco de atenção) e a accountability. Estas conclusões forneceram conhecimento e orientação aos gestores do setor público sobre a implementação da Gestão de Riscos eficaz para aumentar a accountability. Essa implementação requer o desenvolvimento de uma política abrangente de Gestão de Riscos, que conduza à diminuição do risco de falha no serviço público e, como consequência, ocasione a melhora do desempenho das organizações.

**Palavras-chave:** Gestão de Riscos; *Accountability*; Sistema de Medição de Desempenho; Setor público.

## ABSTRACT

Alves, Diego Soares (2024). The relationship between Performance Measurement System, Risk Management practices and Accountability in the public sector (Dissertation). Postgraduate Program in Administration (PPGA), Western Paraná State University – UNIOESTE, Cascavel, PR, Brazil

Performance management improves the effectiveness of public services and has a positive impact on the results for users of these services. However, risks can interfere with an organization's efforts to achieve its goals. In addition, the performance of government agencies is subject to expectations that are assessed by accountability, which is commonly associated with the idea of reporting and/or responsibility. This scenario pressures the public sector to seek ways to reduce the occurrence of irregularities, non-compliance with regulations, and poor management of government assets. To achieve this, sophisticated tools and strategies are necessary to enforce responsible administrative behavior. This dissertation aimed to investigate the relationship between the Performance Measurement System, Risk Management, and Accountability in the public sector. To meet the objective, the measures of Al-Tamimi and Al-Mazrooei (2007) were adapted to capture Risk Management practices, and the measures of Geer et al. (2008) for accountability, while the measures for the use of Performance Measurement Systems were adapted from Henri (2006). Through these measures, the relationships between the use of the Performance Measurement System and Risk Management practices, the Risk Management practices and accountability, and the mediating effect of Risk Management on the relationship between the use of the Performance Measurement System and accountability were examined. Data collection was carried out via email, containing the link to access questionnaires hosted on Google Forms. The research questionnaires were distributed to 287 individuals responsible for Risk Management in government ministries, decentralized units, and indirect administration institutions. The sample consisted of 166 valid responses, which were analyzed using partial least squares structural equation modeling (PLS-SEM) techniques. The study's results showed that all dimensions of the use of the Performance Measurement System have significant positive effects on different dimensions of Risk Management practices. When testing the relationship between Risk Management practices and accountability, it indicated that risk assessment has a significant positive effect on accountability. Additionally, it mediated the relationship between the types of use of the Performance Measurement System (monitoring and focus of attention) and accountability. These findings provided knowledge and guidance to public sector managers on implementing effective Risk Management to enhance accountability. This implementation requires the development of a comprehensive Risk Management policy, which leads to a reduction in the risk of failure in public services and, consequently, improves organizational performance.

**Keywords:** Risk Management; Accountability; Performance Measurement System; Public Sector.

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# LIST OF ABBREVIATIONS AND ACRONYMS

ABNT	Associação Brasileira de Normas Técnicas (Brazilian Association of Technical				
Standards)					
AC	Alfa de Cronbach (Cronbach's alpha)				
AFC	Análise Fatorial Confirmatória (Confirmatory Factor Analysis)				
AVE	Average Variance Extracted				
CGU	Controladoria Geral da União (Federal Comptroller General)				
ERM	Enterprise Risk Management				
Fala.BR	Plataforma Integrada de Ouvidoria e Acesso à Informação (Integrated				
Ombudsman a	and Information Access Platform)				
IGG	Índice de Governança e Gestão (Governance and Management Index)				
IN	Instrução Normativa (Regulatory Instruction)				
IPMA	Importance–Performance Map Analysis				
ISO	International Organization for Standardization				
ODS	Objetivo de Desenvolvimento Sustentável (Sustainable Development Goal)				
PLS-SEM	Partial Least Squares Structural Equation Modeling				
SGC	Sistema de Controle de Gestão (Management Control System)				
SIORG	Sistema de Organização e Inovação Institucional do Governo Federal (Federal				
Government Institutional Organization and Innovation System)					
TCU	Tribunal de Contas da União (Federal Court of Accounts)				

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#### **1** INTRODUCTION

Performance management improves the effectiveness of public services and, consequently, has a positive impact on the outcomes for users of these services (Andrews, 2014). Therefore, organizations are constantly concerned with finding better ways to measure, analyze, and report their activities in order to achieve more effective results (Choong, 2013).

Performance measurement is, therefore, a prerequisite for improving performance (Goshu & Kitaw, 2017) and has thus become a common practice in various sectors of industry and commerce, as well as in the public sector (Bititci et al., 2012). However, it needs to work in conjunction with other elements to quantify the efficiency and effectiveness of actions, thereby helping to form a performance measurement system (Neely et al., 1995).

The term "Performance Measurement System" can be explained by three interrelated elements: individual measures that quantify the impact of specific actions; a set of measures that combine to assess the performance of an organization as a whole; and a support infrastructure that allows data to be acquired, grouped, classified, analyzed, interpreted, and disseminated for use in management (Kennerley & Neely, 2003).

When well implemented, the Performance Measurement System provides performance measures to monitor progress towards achieving goals. Moreover, these measures can send an early signal to the Risk Management department to identify and mitigate all risks capable of causing a deviation from the goal (Arena & Arnaboldi, 2014).

Risk can be defined as an uncertain future event that may interfere with an organization's efforts to achieve its objectives (Sobel & Reding, 2004). In this context, Risk Management plays the role of improving decision-making processes under uncertainty to maximize benefits and minimize costs for society (Hinna et al., 2018).

Risk Management is part of the management and governance framework (Hinna et al., 2018), and in the public sector, accountability mechanisms are considered in the governance context, including organizational structure and tools (Almquist et al., 2013). These characteristics were validated by the publication of Joint Regulatory Instruction between the Ministry of Planning and the Federal Comptroller General – *Controladoria Geral da União* – (MP/CGU) No. 01/2016, which addresses internal controls, Risk Management, and governance in the Federal Executive Branch. The regulation integrated Risk Management practices with accountability.

Accountability is important as it is one of the pillars for improving public administration and democracy itself (Schommer et al., 2015) and can be associated with the idea of rendering accounts and/or responsibility (Medeiros et al., 2013; Pinho & Sacramento, 2009). Thus, it deals with the evaluation of expectations regarding the actions of the public sector or includes the different ways in which government bodies and their employees handle the various expectations created both internally and externally to the institution (Romzek & Dubnick, 2001).

Therefore, public sector managers need to develop the ability to identify and manage risks and opportunities in order to ensure accountability (Queensland Treasury, 2020). As a result, improving accountability can reduce the risk of failure in public services (Tarek Rana & Rana, 2021).

#### 1.1 THE RESEARCH PROBLEM

The public sector seeks to reduce the occurrence of issues such as irregularities, noncompliance with regulations, and poor management of public services, and for that, sophisticated tools and strategies are necessary to impose responsible administrative behavior (Siddiquee, 2006). Among these strategies, the need for Risk Management arises to build trust in modern governments and the importance of incorporating it into a framework of governance, performance, and accountability practices (Tarek Rana & Rana, 2021; Mahama et al., 2020; Rana et al., 2019).

The literature has already indicated that Risk Management practices could be used to address issues related to the accountability of Public Institutions in delivering better results, a better cost-benefit ratio (Collier & Woods, 2011; Leung & Isaacs, 2008), and to control objectives. Therefore, there is relevance in producing research that can investigate the impact of Risk Management practices on organizational accountability, as the concept requires demonstrating Risk Management initiatives (Nyland & Pettersen, 2015; Spira & Page, 2003).

Thus, it is timely to examine the different processes and practices of Risk Management in order to analyze the variations of these practices within Federal Public Institutions, especially regarding their effect on accountability. The most used practices in Public Institutions refer to three crucial Risk Management processes: identification, assessment, and monitoring (Rasid et al., 2019; Mikes & Kaplan, 2013; Al-Tamimi & Al-Mazrooei, 2007). Some studies have investigated Risk Management with compliance or performance outcomes (Arena et al., 2010; Mikes, 2009; Mikes, 2009), while others examine or compare its processes or practices (Al-Tamimi & Al-Mazrooei, 2007; Mikes & Kaplan, 2013), especially in the public sector (Rasid et al., 2019; Palermo, 2014; Woods, 2009; Baldry, 1998). However, these findings refer to other countries, and the Brazilian context may likely present different conclusions.

Other studies that investigated the consequences of Risk Management focused on the use and design of the Enterprise Risk Management (ERM) system and used various measures as indicators, including: the appointment of a Risk Manager (Liebenberg & Hoyt, 2003; Beasley et al., 2008; Pagach & Warr, 2011), stages of ERM practices (Beasley et al., 2005), ERM ratings within and outside the standard (McShane et al., 2011; Baxter et al., 2012), and the identification of ERM activities. Even in these cases, these studies are considered limited in the public sector (Bracci et al., 2022; Palermo, 2014; Woods, 2009).

The use of the Performance Measurement System is considered a crucial element related to Risk Management practices (Loosemore et al., 2005). Performance measures can allow managers to identify risks and opportunities associated with a goal or decision, providing information that turns into targets for successful Risk Management (Loosemore et al., 2005; Chapman, 2006).

According to the classification proposed by Henri (2006), two types of Performance Measurement System usage were selected for this study, referring to the nature of performance measures: use for monitoring and use for focus of attention. The author presents other types of use, but subsequent studies have shown that monitoring and focus of attention are strongly associated with organizational performance (Nitzl et al., 2019; Speklé & Verbeeten, 2014).

Therefore, this study focuses on information from the Performance Measurement System implemented through Risk Management practices to produce control and risk-based decisions that can improve accountability.

Another important gap that has been observed relates to the location and context of previous studies. Rasid et al. (2019) found that Risk Management practices mediated by the performance measurement system can contribute to improving the accountability of the Malaysian public sector. In the study by Rana et al. (2019), the Australian government's initiative to incorporate Risk Management into the governance, performance practices, and accountability of its public sector was investigated.

However, no studies were found that jointly investigate the factors discussed here in the reality of the Brazilian public sector.

In this context, the following research question arises: What is the relationship between Performance Measurement Systems, Risk Management practices, and accountability in Brazilian Federal Public Institutions?

#### 1.2 GOALS

1.2.1 General

Based on the justifications presented, the objective of this study is to analyze the relationship between the use of Performance Measurement Systems, Risk Management practices, and accountability in Federal Public Institutions.

1.2.2 Specific

a) To investigate the relationship between the use of Performance Measurement Systems for monitoring and risk management practices in Federal Public Institutions;

b) To examine the relationship between the use of Performance Measurement Systems for attention focus and risk management practices in Federal Public Institutions;

c) To Analyze the relationship between risk management practices and accountability in Federal Public Institutions;

d) To assess the mediation of risk management between the use of the Performance Measurement System for monitoring and accountability in Federal Public Institutions;

e) To investigate the mediation of risk management between the use of the Performance Measurement System for attention focus and accountability in Federal Public Institutions.

## 1.3 JUSTIFICATION AND CONTRIBUTION

This study contributes to theory in several ways. First, it aligns with the objectives of the Strategy and Competitiveness research line of the Graduate Program in Administration at UNIOESTE, considering that performance measurement systems can be used to monitor the business, allowing for the identification and quantification of the efficiency and effectiveness of activities, thereby providing managers with greater control and alignment of objectives with organizational strategy (Neely et al., 1995).

Second, the writing analyzes an important factor for the public sector: the investigation of the effect of risk management practices on accountability. Previous studies on risk management have focused on specific contingency factors within companies and various outcomes, including organizational performance and firm value (Subramaniam et al., 2011; Gordon et al., 2009), shareholder wealth (Beasley et al., 2008), and corporate governance (structure) (Baxter et al., 2012; Liebenberg & Hoyt, 2003; Beasley et al., 2005).

Third, this work expands the list of studies in the risk management literature that investigate the factors or motivators for risk management practices—in this case, the use of performance measurement systems (Henri, 2006). Thus, this writing aims to contribute to the call for more studies around risk management in the public sector (Woods, 2009; Palermo, 2014) and the factors influencing its success (Rana et al., 2019).

Fourth, the research can provide insights into the mediating role of risk management practices in accountability.

From an empirical perspective, the conclusions of this study may provide useful information to public managers on how performance measurement systems interact with risk management practices to reduce losses in activities such as government procurement or to prevent fraud in public integrity.

It is expected that the results of the study will assist Internal Auditors of Federal Public Institutions in evaluating risk management practices and provide insights on management and internal control, which will consequently improve the institution's ranking in the Governance and Management Index, translated as *Índice de Governança e Gestão* (IGG), of the public sector.

As the objectives of this study seek to examine the relationship between governance mechanisms such as risk management and accountability, the findings of this research may provide information about positive interactions between these mechanisms, contributing to Sustainable Development Goal, from the Portuguese *Objetivo de Desenvolvimento Sustentável* (ODS), number 16 in the effort to develop effective, accountable, and transparent institutions at all levels.

It is also anticipated that the results of this study will help political managers, especially from the Brazilian federal executive branch, identify the uses and practices that present the greatest implementation challenges in Federal Public Institutions, utilizing this information to enhance risk management guidelines.

#### 1.4 DISSERTATION STRUCTURE

This dissertation is composed of five chapters. Section 1 addresses the introduction of the research. Section 2 presents the literature on risk management practices, the use of performance measurement systems, and accountability. This section also discusses the research hypotheses to be tested based on the proposed conceptual framework.

Section 3 describes the methodological procedures applied in the research, including the research design, sampling and data collection procedures, the measurement instrument, the pilot study, and plans for data analysis.

Section 4 discusses the data and analyzes the results. Finally, Section 5 revisits the study's findings, theoretical contributions, practical implications, and limitations, providing suggestions for future research.

#### **2** THEORETICAL REFERENCES

This section presents the theoretical principles that justify the importance of conducting this study. The first subsection details the fundamental concepts related to performance measurement systems. Next, the concepts and applications related to risk management are discussed, with a special focus on risk management practices. The third subsection explores the theoretical aspects related to accountability.

#### 2.1 PERFORMANCE MEASUREMENT

Performance measurement saw its greatest development starting in the 1980s, when non-financial measures began to be considered important for businesses, allowing for the inclusion of other concepts beyond metrics strictly related to costs and profitability (Goshu & Kitaw, 2017). Additionally, this approach, relying solely on financial measures like return on investment, leads to a short-term view, lacks strategic focus, and does not support business management (Neely et al., 1995).

Organizations are still heavily dependent on traditional finance-based measures, and resistance to adopting new measures mainly occurs due to the lack of consensus on which measures should be used and what selection criteria should be applied, considering that it requires a complex undertaking (Muravu, 2021).

Developing a performance measure involves much more than defining a robust formula, as it can lead to dysfunctional behavior on the part of individuals when designed inappropriately (Neely et al., 1997). In other words, simply having performance measurement within the organization does not guarantee success.

There are two rules for performance measures: (1) the measure must be kept physical (i.e., quantitative) and (2) the measure should be taken close to the customer/user, whenever possible (Folan & Browne, 2005).

Regarding types, Gao (2015) separates them into two: objective measurement and subjective measurement. The author emphasizes that objective measurement refers to measures that can provide reliable information for decision-making, while subjective measurement encompasses perceptions and attitudes regarding service delivery.

Folan and Browne (2005) indicate a way of measuring by separating it into two other types: the structural framework (which specifies a typology for managing performance measures) and the procedural framework (a step-by-step process for developing performance measures from strategy). However, since these measures directly affect organizational performance, a proper assessment of the number of goals and objectives to be achieved is necessary, as an excessive and complex number can harm performance (Gao, 2015).

Another characteristic of measures is that they should support strategic management, ensuring they are relevant for managers and employees in carrying out their daily work, as well as being part of a constant feedback loop that links them to performance evaluations (Folan & Browne, 2005).

Promoting performance measurement as a tool to assess managerial accountability implies that managers need to use performance data to demonstrate that the resources allocated to their programs have been used efficiently, and they should be encouraged to improve the operations of the programs under their administration (Newcomer, 1999).

Considering this, society has increasingly demanded results that meet its needs. This led to the desire to implement management models suitable for the public sector, one of which is the implementation of a performance measurement system (Paz, 2003).

The prerequisite for improving performance is performance measurement (Goshu & Kitaw, 2017). This process showcases performance metrics as the main element, which are used to quantify the efficiency and effectiveness of actions, and when used together, form a performance measurement system (Neely et al., 1995).

This, in turn, requires a profound change in how performance is measured in businesses and should ensure that all measures have the same value in determining strategy, in order to maintain competitiveness and quality of products or services (Eccles, 1991).

The term "performance measurement system" can be explained by three interrelated elements: individual measures that quantify the impact of specific actions; a set of measures that combine to evaluate the performance of an organization as a whole; and a support infrastructure that allows data to be acquired, grouped, classified, analyzed, interpreted, and disseminated for management use (Kennerley & Neely, 2003).

There are several characteristics found in effective performance measurement systems that can be used to evaluate measurement systems. Among them, inclusivity (measuring all relevant aspects), universality (allowing comparison under various operational conditions), measurability (necessary data must be measurable), and consistency (measures consistent with organizational objectives) stand out (Beamon, 1999).

Additionally, Choong (2014) highlights the fundamental characteristics of performance measurement systems in terms of system aspects, measurement and performance aspects, resources of the performance measurement system, stakeholders of the performance measurement system, communication and information aspects, and management aspects.

Regarding design, performance measurement systems should include both financial and non-financial measures to operationalize strategic objectives and, according to Franco-Santos et al. (2012), should meet three conditions:

• The role of performance measurement systems is to evaluate performance for information or motivational purposes;

• Performance measurement systems encompass a support infrastructure;

• Performance measurement systems involve specific processes for information provision, measure design, and data capture.

In addition, it is important that the performance measurement system allows for communication and dissemination of its results to establish feedback and performance evaluations, as well as to support management and decision-making (Choong, 2014).

Regarding the public sector, Moura et al. (2019) present several factors affecting the development of performance measurement systems, categorizing them into three groups: purpose, stakeholders, and management. The authors emphasize that the purpose reflects the social approach of public organizations, where their objectives are focused on social outcomes.

Concerning stakeholders, Moura et al. (2019) point out that they are linked to public bodies through tax payments, local needs, partnerships, and other motivations, which can influence the development of performance measurement projects. Consequently, performance measurement systems are evolving from a static model to a dynamic one, emphasizing learning and reducing control (Bititci et al., 2012).

Management factors relate to various concerns within organizations, influenced by political and economic issues, budget constraints, social pressures, and other aspects (Moura et al., 2019). In this context, performance measurement systems must be developed considering the culture and behavioral routines of public organizations (Garengo & Sardi, 2021).

As Andrews (2014) noted, performance management enhances the effectiveness of public services, positively impacting the outcomes for users. Thus, when designing a

performance measurement system, public organizations need to understand how these factors affect them, including their legitimacy, stakeholder demands, organizational parameters, and their interrelationships (Moura et al., 2019).

However, there is still no consensus on a formal structure for performance measurement systems, as variations in their implementation may occur depending on each organization's internal characteristics and context (Choong, 2014; Goshu & Kitaw, 2017).

Performance tools such as the Balanced Scorecard (BSC), the business excellence model, and the performance pyramid are useful for guiding the planning process of performance measurement systems (Neely et al., 2000). Yet, as various performance measurement models have been adapted and implemented in different public institutions, the specificity of the public sector context has gained relevance, avoiding the direct adoption of private sector models without necessary adjustments (Muravu, 2021).

Thus, the development of current performance measurement systems seeks better methods of measurement and information utilization, considering the broader political and administrative context of public organizations (Gao, 2015). This is because performance measurement systems can serve a variety of purposes within organizations (Spekle & Verbeeten, 2014).

Previous studies have defined several types of uses for performance measurement systems. Simons (1990) proposed two uses: diagnostic and interactive. Hansen and Van der Stede (2004) identified uses such as operational planning, performance evaluation, communication of objectives, and strategy formation. Franco-Santos et al. (2007) categorized uses into five main groups: (1) measuring performance; (2) strategic management; (3) internal and external communication, benchmarking, and regulatory compliance; (4) influencing behavior; and (5) learning and improvement.

Henri (2006) proposed a framework composed of four types of use: monitoring, attention focus, strategic decision-making, and legitimization. This classification by types of use is important as it has been empirically tested and is relevant for performance measurement and decision-making in the public sector (Rasid et al., 2019). Additionally, these typologies provide comprehensive diagnostic uses, aimed at providing information and assisting in resource coordination (Koufteros et al., 2014).

The first type, monitoring, is defined as a feedback system based on a logic where goals are pre-defined, results are measured, objectives and results are compared, feedback is provided, and corrections are made if necessary. The performance measurement system is associated with measuring and reporting performance in meeting stakeholder requirements, acting as a diagnostic control and feedback mechanism, where collected information is used for reporting and external dissemination (Henri, 2006).

The second type, attention focus, refers to signals sent by top management through performance measures to the entire organization, conveying their vision of the organization, key success factors, and critical uncertainties. Performance measurement systems act as an interactive control to promote organizational dialogue, functioning as a tool that promotes specific positions and reflects a particular conception of the organizational mission, where the signals sent indicate the primary and secondary objectives on which employees should focus their attention (Henri, 2006).

Strategic decision-making is the third type, related to non-routine issues that require substantial commitment and have consequences regarding radicality, seriousness, dissemination, and resistance. The performance measurement system is used in strategic decision-making as a learning tool and problem-solving aid, revealing cause-and-effect relationships between internal processes and the achievement of objectives (Henri, 2006).

The fourth type is legitimization, where performance measurement systems can be used to justify past actions or decisions made under uncertain conditions. Legitimization also refers to the justification and validation of current and future actions, as well as asserting selfinterest and exercising power (Henri, 2006).

Among the four types of use, monitoring and attention focus were selected as suitable for the objectives of this study. This choice was primarily due to the fact that organizational objectives are typically identified through consultations with stakeholders and are measured by defining key performance indicators (KPIs) associated with each objective. Only after establishing a clear list of objectives and KPIs can managers identify the risks and opportunities associated with a decision (Loosemore et al., 2005).

Monitoring is justified considering that performance measures used to track progress toward achieving goals can send an early signal to the Risk Management department to identify and mitigate all risks that may cause a deviation from the target (Arena & Arnaboldi, 2014).

Thus, monitoring allows managers to track performance against a plan, identify what is wrong and needs correction (Henri, 2006), and make comparisons with targets (Burney & Widener, 2007). For example, top management can set targets for customer service levels, and monitoring can help determine whether these targets have been met and identify areas of underperformance (Koufteros et al., 2014).

The attention focus is justified because it generates information relevant to guiding organization members on strategic importance issues, common concerns, critical success factors, and integration (Koufteros et al., 2014). It is a type of performance measurement use that establishes limits or constraints on employee behavior (Burney & Widener, 2007).

By focusing attention on critical success factors such as customer service levels, top management can promote unified efforts among organizational units, such as procurement, operations, and distribution, as many constituents influence the organization's ability to achieve and maintain high levels of customer service (Koufteros et al., 2014).

Thus, the agreed-upon KPIs help the management team focus precisely on what they are trying to control. Since Risk Management is about achieving objectives, these measurable criteria become the target against which the success of Risk Management is assessed and judged (Loosemore et al., 2005).

## 2.2 RISK MANAGEMENT

There is a wide range of literature addressing the definition of the concept of "risk." Conversely, there are also reflections on the inherent difficulties of this term due to its application in various sectors or areas of action.

Risk is defined as an uncertain future event that can interfere with an organization's efforts to achieve its objectives (Sobel & Reding, 2004). Hill (2006) defines it as the probability that an event, whether good or bad, will occur in the future. According to the Brazilian Institute of Corporate Governance (*Instituto Brasileiro de Governança Corporativa* - IBGC, 2007), risk is understood as the possibility of something going wrong, currently involving in its concept the quantification of uncertainty regarding losses and gains when compared to the planning carried out, whether by individuals or organizations.

The Regulatory Instruction No. 01/2016 (IN MP/CGU nº 01/2016) presents a very similar concept as the possibility of an event occurring and impacting the achievement of objectives. In a more recent definition, it appears as the effect of uncertainty on objectives (Brazilian Association of Technical Standards [*Associação Brasileira de Normas Técnicas* - ABNT], 2018).

According to Domokos et al. (2015), the different definitions of risks found in the literature include common elements such as an undesirable event – which can cause failures in the execution of activities, errors, deficiencies, irregularities, damage, or losses – that may potentially occur and impact, varying in degree, the achievement of organizational objectives, activities, and operations.

Initially, risk was associated with negative effects and described as a threat of potential losses. Thus, the objective was to minimize these losses and avoid risky actions that would lead to organizational instability (Collier, 2009).

Subsequently, it was also referred to with positive effects, with the purpose of leveraging it for the benefit of the organization (Collier, 2009). Therefore, a risk can result in negative or positive consequences (Burtonshaw-Gunn, 2016; Drew et al., 2006; Tang, 2006), carrying this characteristic in any organizational environment; however, if organized – identified, analyzed, evaluated, and treated – it becomes manageable (Power, 2007).

Risk Management works to identify critical risks and determine appropriate responses (Epstein & Rejc, 2005). In this context, it is central to any organization, established through a systematic, continuous process integrated into the organizational culture. It supports accountability, performance measurement, and rewards, thus promoting operational efficiency at all levels (FERMA, 2003).

It is also frequently perceived as a specific practice imposed to reduce the potential adverse effects caused by risk factors arising from internal and external events to the organization (Andersen, 2008).

However, this view has become limited for contemporary organizations. Currently, Risk Management is no longer considered just a technical tool; it has evolved into a guiding management model aimed at enhancing institutional capacities (Fone & Young, 2000; Silva et al., 2021).

Thus, Risk Management is also understood as the process by which organizations systematically manage their risks within the context and objectives they aim to achieve (Collier et al., 2006), seeking to create an advantage over the various factors to which they are exposed (Meulbroek, 2008; Nocco & Stulz, 2006). Additionally, it aims to establish an adequate understanding of risk to align with the organization's goals and purposes, contributing to the maximization of long-term results (Fone & Young, 2000).

The practice provides benefits such as increasing the efficiency and effectiveness of organizations in their operations, but to be successful in its implementation, it must be proportional, aligned, comprehensive, embedded, and dynamic (Hopkin, 2018). Another noted benefit is that Risk Management preserves and adds value to the organization, essentially contributing to achieving performance goals, objectives, and fulfilling the institutional mission (Miranda, 2023).

The development of Risk Management practices is increasingly present in the daily lives of organizations. Among the factors contributing to this growth is the increased interest in improving institutional governance, adopting best practices, and enhancing the performance and quality of public services offered (Mahama et al., 2022; Soin & Collier, 2013).

Additionally, there is a coercive force stemming from pressures from control bodies, particularly in the case of the Brazilian public sector, which has impacted the dissemination of its use. However, this dissemination has only been recorded recently (Souza et al., 2020).

Given the need for Public Administration to deliver the best public value, fostering a culture of Risk Management becomes an ally in defining strategies, making appropriate decisions, and achieving organizational objectives (Federal Court of Accounts [*Tribunal de Contas da União* - TCU], 2018).

For Fone and Young (2000), Risk Management is a fundamental purpose in the context of the public sector, as it is the responsibility of public organizations to assess and manage risks that may affect their objectives and consequently impact the provision of services to society as a whole. However, it was only from 2016, with the leading role of control bodies as drivers of this process (Souza et al., 2020), that Risk Management effectively entered the public agenda in the Brazilian public sector.

According to Hinna et al. (2018), Risk Management reflects the desire to improve decision-making processes under uncertainty, aiming to maximize benefits and minimize costs for society. However, the authors point out that in order to reach its potential within the organizational context, Risk Management must adapt to the specific characteristics of each organization.

The implementation of Risk Management in the public sector has the main benefits of improving the achievement of organizational objectives, increasing efficiency, and enhancing the quality of public service delivery (Ramos et al., 2021), improving governmental decision-making processes and the performance of public services (Klein Junior, 2020).

In these terms, Risk Management promotes a link between the organization and the environment in which it operates, being seen as a critical factor at the organizational level (Soin & Collier, 2013). This is because Risk Management is an integral part of the management and governance structure (Hinna et al., 2018).

For Mahama et al. (2022), integrated risk management allows the organization to move beyond compliance issues, adopting a more comprehensive approach that encompasses strategy and organizational processes. For the authors, an important factor to be considered is the maturity level of the organization's Risk Management practices, as the higher this level, the greater the interaction of Risk Management throughout organizational processes is likely to be. This situation should be at the forefront of public sector management's attention in the pursuit of improving service delivery.

Different types of industries design different control systems to accommodate their needs, resulting in systematic variations in the type of Risk Management structure and the stages of Risk Management practiced (Mikes, 2009).

Thus, some organizations invest in sophisticated Risk Management systems, while others develop a complete Risk Management structure, and others practice Risk Management through a partial structure (Paape & Speklé, 2012).

Despite the increasing research on the adoption and use of Risk Management, few studies (Al-Tamimi & Al-Mazrooei, 2007; Mikes & Kaplan, 2013) examine or compare the different processes of Risk Management practices. Therefore, it is relevant to examine the different processes of Risk Management practices to investigate the variations of Risk Management practices within Federal Public Institutions.

Thus, a brief discussion of Risk Management practices according to ABNT NBR ISO 31000:2018 will be presented next, which is considered by the TCU as one of the international references on the subject and is relevant for achieving the objectives of this study.

In 2009, the International Organization for Standardization (ISO) launched the ISO 31000 family, consisting of standards and guidelines intended to provide information and recommendations for those wishing to implement it. Its purpose is to provide the necessary foundations for any individual or company to utilize its risk management framework, regardless of their field of activity, size, or specific sector.

The general principles were developed from a discussion held by a working group formed by designated experts and representatives from various organizations from 28 countries.

ABNT, after reviewing the 2009 version, published ISO 31000 in 2018 (ABNT, 2018), which presents guidelines for Risk Management that can be adapted according to the needs of each organization.

These principles provide guidance on the characteristics of effective and efficient Risk Management, communicating its value and explaining its intent and purposes. These characteristics serve as a basis for managing risks and are defined as follows (ABNT, 2018):

• Integrated - Risk Management is an integrated part of all organizational activities;

• Structured and comprehensive - A structured and comprehensive approach to Risk Management contributes to consistent and comparable results;

• Customized - The Risk Management structure and process are customized to the organization's external and internal contexts related to its objectives;

• Inclusive - Appropriate and timely stakeholder engagement enables their knowledge, views and perceptions to be considered. This results in improved awareness and informed Risk Management;

• Dynamic - Risks can emerge, change or disappear as the external and internal contexts of an organization change. Risk Management anticipates, detects, recognizes and responds to these changes and events in an appropriate and timely way;

• Best available information - Inputs to Risk Management are based on historical and current information, as well as future expectations. Risk Management explicitly considers any limitations and uncertainties associated with this information and expectations. Information should be timely, clear and available to relevant interested parties;

• Human and Cultural Factors - Human behavior and culture significantly influence all aspects of Risk Management at every level and stage;

• Continuous Improvement Risk Management is continuously improved through learning and experiences.

On the other hand, the process consists of systematically implementing policies, procedures and practices for the following activities (ABNT, 2018):

• Communication and consultation – involve assisting relevant stakeholders in understanding the risk, the basis on which decisions are made and the reasons why specific actions are required;

• Establishing the scope, context and criteria – aims to personalize the Risk Management process, enabling an effective risk assessment process and appropriate risk treatment;

• Risk identification – consists of finding, recognizing and describing risks that can help or prevent an organization from achieving its objectives;

• Risk analysis – aims to understand the nature of the risk and its characteristics, including the level of risk;

• Risk assessment – is intended to support decisions and involves comparing the results of risk analysis with established risk criteria to determine where further action is needed.

• Risk treatment – involves selecting and implementing options for how to address risks. This iterative process involves formulating, planning, and evaluating the effectiveness of treatment, as well as deciding whether the remaining risk is acceptable and, if not, undertaking further treatment;

• Risk monitoring – aims to ensure and improve the quality and effectiveness of the design, implementation and results of the process.

Although the process described by the standard is relatively simple, the structure and procedures must be integrated into management systems in order to ensure consistency and effectiveness of managerial control across all areas of the organization. Considering these factors, it is possible to conclude that the NBR ISO 31000:2018 (*Norma Brasileira Reguladora* - Brazilian Regulatory Standard ISO 31000:2018) functions as a generic standard that encompasses all types of risks and provides guidelines for the organization to anticipate the broadest range of imaginable risks. Since it is not a certification standard, the ISO 31000 series aims to help each institution create its own Risk Management routine according to its conditions and peculiarities and implement it efficiently.

Thus, the structure contained in the standard can support the organization in managing the risks of its activities, but its effectiveness will depend on its integration with governance in other organizational activities. Furthermore, stakeholder support is necessary for the development, implementation, evaluation, and improvement of the organization's Risk Management. To meet the objectives of this study, three essential Risk Management activities will be examined in greater detail: risk identification, risk assessment, and risk monitoring.

The first activity in Risk Management practices – risk identification – focuses on recognizing the sources of risk and their causes, as well as future consequences (ABNT, 2018).

The objective is to generate a comprehensive list of risks that could hinder the achievement of objectives. This process is fundamental to ensuring that all risks are included in subsequent analyses. The events identified in this process are categorized as either positive impacts (opportunities) or negative impacts (risks).

Typically, the tools and techniques used for risk identification align with the organization's objectives (ABNT, 2018). These techniques include interactive methods, such as face-to-face interviews and workshops, or self-assessment techniques, including the review of historical data and personal experiences (Mikes & Kaplan, 2013).

Risk identification techniques are applied with varying frequencies (Committee of Sponsoring Organizations of the Treadway Commission [COSO], 2004), depending on the speed at which risks evolve (Mikes & Kaplan, 2013). The next activity in Risk Management practices is risk assessment, which, due to its decision-making nature, relies on data from prior analysis to make sense.

Basically, risk analysis assesses the organization's risk levels (ABNT, 2018), considering causes, consequences, the likelihood of occurrences, and the impact on achieving objectives. Likelihood and impact are combined to determine the inherent risk level (Inherent Risk = Probability x Impact).

According to the TCU (2018), the inherent risk level (IRL) is measured before considering the responses that management adopts to reduce the likelihood of the event or its impacts on objectives, even considering internal controls. Based on this calculation, the risk will be classified within a scale according to Figure 1.

#### Figure 1

Risk Scale

Escala	Faixa		
RB – Risco Baixo	0 a 9,99		
RM – Risco Médio	10 a 39,99		
RA – Risco Alto	40 a 79,99		
RE – Risco Extremo	80 a 100		

Caption: Escala: Scale; Faixa: Range; Risco Baixo: Low Risk; Risco Médio: Medium Risk; Risco Alto: High Risk; Risco Extremo: Extreme Risk.

Note: Retrieved from *Risk Management Methodology* – originally *Metodologia de Gestão de Riscos* (CGU, 2018).

The results of the probability and impact combinations, classified according to the risk level scale, can be expressed in an inherent risk matrix, such as Figure 2.

#### Figure 2

	Muito Alto 10	10 RM	20 RM	50 RA	80 RE	100 RE
IMPACTO	Alto 8	8 RB	16 RM	40 RA	64 RA	80 RE
	Médio 5	5 RB	10 RM	25 RM	40 RA	50 RA
	Baixo 2	2 RB	4 RB	10 RM	16 RM	20 RM
	Muito Baixo 1	1 RB	2 RB	5 RB	8 RB	10 RM
		Muito Baixa 1	Baixa 2	Média 5	Alta 8	Muito Alta 10
	PROBABILIDADE					

Inherent Risk Matrix

Caption: Impacto: Impact; Probabilidade: Probability; Muito Baixo (a): Very Low; Baixo (a): Low; Médio (a): Medium; Alto (a): High; Muito alto (a): Very High.

Note: Retrieved from *Risk Management Methodology* – originally *Metodologia de Gestão de Riscos* (CGU, 2018).

Therefore, based on the classification conducted in the analysis, the risk assessment activity considers whether a given risk is acceptable, tolerable, or unacceptable. It compares the organization's risk level with the established risk criteria, and this comparison effort leads to decisions regarding: (1) risk treatment plans, (2) additional analyses, or (3) maintaining existing controls (ABNT, 2018).

The next activity is risk monitoring, which observes and analyzes the overall Risk Management process. This activity involves continuous observation of any variation, from the target to regular verification and surveillance (ABNT, 2018). In this study, the risk monitoring

and review process (Al-Tamimi & Al-Mazrooei, 2007) analyzes all aspects of Risk Management to: (1) ensure the effectiveness of Risk Management control, (2) evaluate the effectiveness of risk assessment, (3) monitor changes in risk criteria, and (4) review risk treatment or priorities (ABNT, 2018).

The public sector perceives Risk Management as a good governance mechanism aimed at achieving organizational objectives (Woods, 2009). Thus, studies on Risk Management in the public sector seek to improve governance, specifically to respond to stakeholders' demands for better control of public resources and to focus on exploiting risks within the government's contractual relationships (Rasid et al., 2019).

As the objective of Federal Public Institutions is to provide quality services to citizens, the application of Risk Management practices in these institutions is expected to comply with the principles and standards of Risk Management proposed by the integrated ERM framework (COSO, 2004) or by NBR ISO 31000:2018 (Norma Brasileira Reguladora - *Brazilian Regulatory Standard* ISO 31000:2018).

Following this trend, the Brazilian public sector saw the publication of MP/CGU n° 01/2016, which addresses internal controls, Risk Management, and governance in the Federal Executive Branch, being the first to mandate the Federal Public Administration to address this topic.

This standard establishes a series of determinations, among which the requirement for federal executive branch agencies and entities to implement, maintain, monitor, and review the Risk Management process, compatible with their mission and strategic objectives, stands out. Moreover, the Regulatory Instruction, translated from *Instrução Normativa*, (IN) sets the deadline for establishing a risk management policy within these organizations (MP & CGU, 2016).

Subsequently, decree n° 9.203/2017 was issued, which dealt with the governance policy of the direct, autonomous, and foundational federal public administration, including risk management as a public governance guideline. This inclusion was pertinent, considering that strategic decisions generally involve uncertain outcomes, as they are essential for long-term organizational survival (Mintzberg et al., 1976).

In this context, the Decree stipulates that risk management be implemented and applied systematically, structured, and integrated with strategic planning; however, it is expected to

permeate all organizational levels and thus contribute to achieving institutional objectives (Miranda, 2023).

To some extent, stakeholders expect employees and public servants to implement controls when dealing with risks: for instance, strategy, operation, legal compliance, and financial reporting (COSO, 2004).

Strategists are aware that corporate disasters can occur if risks are poorly managed, so they need to know what information is available or not to handle risk needs (Baird & Thomas, 1985). Thus, public sector managers need to be equipped with the ability to identify and manage risks and opportunities to ensure accountability (Queensland Treasury, 2020).

However, unexpected implications in public sector reform initiatives may undermine control efforts and affect accountability (Nyland & Pettersen, 2015). Additionally, the transformation of the public sector in terms of restructuring and operations through hybrid formations, such as public-private collaborations and private financing initiatives, is exposing the public sector to greater risks. This further challenges its control structure and accountability (Nyland & Pettersen, 2015).

Among the challenges mentioned, it is noted that the literature on Risk Management, both at the international and local levels, has not adequately addressed its practices in the public sector (Baldry, 1998), especially regarding the impact of these practices on accountability.

## 2.3 ACCOUNTABILITY

Accountability is one of the pillars for improving not only public administration but also democracy itself (Schommer et al., 2015). There are several meanings associated with accountability, and due to the complexity of literal translation, it can be understood as the delegation of power from stakeholders (main) to managers (agents) (Broadbent et al., 1996; Gray & Jenkins, 1993; Sinclair, 1995). It can also be understood as the need to provide reasons for certain actions taken by those who deserve clarification (Parker & Gould, 1999), or as the idea of accounting for and/or taking responsibility (Medeiros et al., 2013; Pinho & Sacramento, 2009). Broadly speaking, it can also be understood as control, transparency, obligation, responsibility, and accountability for those holding office and required to account for their actions according to legal parameters (Silva, 2018).

In a way, accountability manifests when someone assumes the burden delegated by another person, who demands accountability. The evaluation of these accounts may result in the imposition of responsibility (Pinho & Sacramento, 2009). Thus, in a broad sense, it deals with the evaluation of expectations regarding the actions of public authorities and includes the different ways in which government bodies and their collaborators handle the various expectations created internally and externally (Romzek & Dubnick, 2001).

Citing some classifications, traditional accountability, which begins with Stewart's (1984) accountability scale, encompasses legal accountability, probity, and accountability for programs, performance, processes, and policies (Rasid et al., 2019). Later, Sinclair (1995) identified five distinct dimensions of accountability: managerial, public, fiduciary, political, and personal.

Accountability can also be classified as vertical and horizontal (O'Donnell, 1998; Silva, 2018). However, this approach presents limitations as it disregards power asymmetries and the diversity of roles played by public agents and society (Schommer et al., 2015). While vertical accountability refers to oversight promoted by citizens and civil society, horizontal accountability is carried out through institutionalized control and oversight mechanisms between branches of government, as well as the actions of other governmental institutions (Silva, 2018).

There is also the categorization into four stages, encompassing the multiplicity of interactions within the system: classical, transversal, systemic, and diffuse accountability (Schommer et al., 2015).

Classical accountability can be considered the first stage, where the level of interaction and influence between social and institutional control mechanisms is low. There is no coproduction of information and control, and elections are emphasized as the primary means of punishment or reward (Schommer et al., 2015).

In transversal accountability, the interaction between social and institutional control mechanisms begins to take on new forms. The influence of the former on the latter increases, and there is a sharing of state apparatus activities with organized civil society (Schommer et al., 2015).

In systemic accountability, information and control are coproduced in various ways and at different levels by citizens and government. At this stage, the state apparatus takes on a more flexible form, resembling a network (Schommer et al., 2015). Finally, diffuse accountability is considered an ideal type, where information and control would be produced by various agents, without depending on the state apparatus (Schommer et al., 2015).

Accountability presents three dimensions: emphasis on procedural and economic criteria for the provision of goods and services; the agents representing accountability (government), responsible for delivering services to society; and the means of accountability, which include legislation, parliamentary questions, public hearings, performance analysis, an ethical organizational culture, and pressure from the actors involved in the process (Barbosa, 2020; Silva, 2018).

In the context of public service, accountability can be understood as assigning responsibility to individuals and organizations for the performance of services provided. Various approaches, mechanisms, and practices can be used to ensure the desired level and type of performance (Paul, 1992).

Three elements of accountability have been identified: 1) the obligation to justify actions; 2) execution, meaning consequences are imposed if the action and justification are unsatisfactory; and 3) responsiveness, i.e., the willingness of those responsible to respond to demands made (Silva, 2018; Vian, 2020).

Thus, accountability can be classified into two components: accountability for good administration and administrative accountability (Stewart, 1984). In this way, administrators and public agencies are required to respond to public interest. However, the production of public information remains restricted to institutional control bodies, with occasional contributions from society (Schommer et al., 2015).

In the public sector, accountability mechanisms are considered within the context of governance (Almquist et al., 2013), including organizational structure and tools. Therefore, to ensure its effectiveness, managers must be able to identify and manage risks and opportunities (Queensland Treasury, 2020), thus reducing the risk of failure in public service (Tarek Rana & Rana, 2021).

## 2.4 RESEARCH HYPOTHESES AND THEORETICAL DESIGN

Based on the research problem and the outlined objectives, the research hypotheses were developed, representing preliminary explanations for the phenomena studied (Sampieri et al.,
2013), as well as predictions of responses to a question, which may be confirmed or refuted by the research results (Martins & Theóphilo, 2009).

In the context of descriptive studies, hypotheses should be formulated when a prediction is made about an event (Sampieri et al., 2013). The hypotheses in this study were formulated in a directional format, as they are based on conclusions from previous research (Creswell, 2010). The purpose is to reflect the relationship between the use of Performance Measurement Systems, Risk Management practices, and accountability in the studied context.

Initially, it is expected that Performance Measurement Systems will be positively related to Risk Management, although empirical studies have shown inconclusive results so far.

Henri (2006) presented the diversity of measurement and the nature of use as two interconnected dimensions of Performance Measurement Systems. The author pointed out that usage influences the combination of financial and non-financial measures and that, depending on the nature and intensity of use, measurement diversity can vary.

Speklé and Verbeeten (2014) highlighted the exploratory use of performance measures, which offers public sector managers the opportunity to assess the adequacy of goals and communicate them more clearly. This communication eliminates risks such as ambiguity and confusion about objectives, thereby improving performance.

Beasley et al. (2006) pointed out that Balanced Scorecards, acting as Performance Measurement Systems, measure an organization's progress toward achieving strategic objectives, while Enterprise Risk Management helps leaders reflect on the positive and negative factors that may affect the achievement of their goals.

However, Calandro and Lane (2006) argue that performance measurement/management and risk measurement/management are different functions, often performed by different people within the company. Therefore, the authors recommended that risk scorecards be separated from performance scorecards.

Rasid et al. (2017) found that integrating Enterprise Risk Management with the Performance Measurement System does not improve organizational performance to higher levels than practicing the two frameworks in parallel without any connection.

However, Rasid et al. (2019) found that the two types of Performance Measurement System usage proposed by Henri (2006), specifically the use for monitoring and the use for attention focus, are related to Risk Management. The positive results demonstrate that these uses are drivers that affect different Risk Management processes in the public sector. Nielsen and Pontoppidan (2019) observed that managers attach considerable importance to risk management and try to avoid or encapsulate risk through administrative control systems. Rad (2016) complements these findings by stating that integration also plays a role in determining an organization's performance level.

Kominis et al. (2022) found that risk governance practice is the central mechanism by which interactive Management Control Systems fulfill their role of reducing uncertainty. However, Rana et al. (2019) highlighted that issues related to Risk Management are not properly integrated within the scope of the Management Control System.

Based on the findings and aiming to identify the relationship of each type of Performance Measurement System usage with Risk Management practices, the hypotheses are as follows:

H1A: There is a positive relationship between the use of the Performance Measurement System for monitoring and Risk Management practices within the organization.

H1B: There is a positive relationship between the use of the Performance Measurement System for attention focus and Risk Management practices within the organization.

It is also expected that Risk Management will be positively related to accountability, as empirical studies so far have shown positive results.

Soin et al. (2014) identified that understanding how Risk Management expands and adapts to include accountability facilitates the understanding of the link between Risk Management and management control.

Rothstein et al. (2013) found that risk-driven governance is related to compliance with forecasts of adverse outcomes with national governance and accountability frameworks.

Palermo (2014) found that Risk Management is relevant as a tool for accountability. The author observed that the top-down perspective emphasizes the role of risk management in meeting public accountability expectations, which can be complemented by a bottom-up perspective showing how risk management tools depend on relational competencies, professional experience, and business knowledge.

Johari, Said, and Anuar (2017) found that risk management factors, accountability, and management commitment are positively related to integrity practices in Malaysia's public sector.

Rasid et al. (2019) found that Risk Management practices can contribute to improving public sector accountability.

Yudiyanto and Ningsih (2023) identified that the implementation of Risk Management, improvement of the internal control system, and enhancement of the Government Internal Supervision Apparatus' capacity can potentially improve accountability for the performance of government agencies.

However, Pangaribuan (2020) pointed out the reverse relationship, where preparing an accountability system for performance has a positive and significant effect on risk management practices.

Thus, the following hypothesis is developed:

H2: Risk Management practices are positively related to accountability.

A mediating effect of Risk Management practices on accountability is expected, although empirical studies so far have shown inconclusive results.

Soin et al. (2014) pointed out that the pressure for more accountability has linked Risk Management to Management Control, with its function being to protect it.

Tarek Rana and Rana (2021) demonstrated that there is a link between weak governance, poor performance information, and accountability, which increases the risk of public service failure.

Rasid et al. (2019) found that Malaysian public institutions that used Performance Measurement System information for multiple purposes placed greater emphasis on Risk Management practices to improve accountability.

Bracci et al. (2022) identified Risk Management as an integration concept that could, therefore, mediate the integrated managerial accounting system to accountability.

Furthermore, some studies highlight the need for Risk Management to build trust in modern governments, emphasizing the importance of incorporating it into a governance, performance, and accountability framework (Tarek Rana & Rana, 2021; Mahama et al., 2020; Rana et al., 2019).

Therefore, the hypotheses are formulated as:

H3A: Risk Management practices mediate the relationship between the use of the Performance Measurement System for monitoring and accountability.

H3B: Risk Management practices mediate the relationship between the use of the Performance Measurement System for attention focus and accountability.

With the definition of the hypotheses to be tested, the theoretical model of the research was developed. The representation was created to reflect the relationship between the use of the performance measurement system, Risk Management practices, and accountability. Figure 3 presents the theoretical model and hypotheses.

## Figure 3

Theoretical Model of the Research



Caption: Sistema de Medição de Desempenho: Performance Measurement System; Uso para Monitoramento: Use for Monitoring; Uso para Foco de Atenção: Use for Focused Attention; Práticas de Gestão de Riscos: Risk Management Practices; Efeito Direto: Direct Effect; Efeito Indireto: Indirect Effect.

# **3** TECHNICAL PRODUCTION RESEARCH METHOD AND TECHNIQUES

This section presents the methodological procedures used in the development of the research, as well as the intervention instrument adopted to achieve the results.

# 3.1 RESEARCH DESIGN

The methodological framework of research is defined as the method or path to reach a specific objective (Martins & Theóphilo, 2009). According to Raupp and Beuren (2006), the research is characterized in terms of objectives, problem approach, and procedures.

Regarding the objectives, this study is descriptive in nature, aiming to describe the relationships between the variables, which in this case are: the use of the performance measurement system, risk management practices, and accountability within the studied population (Martins & Theóphilo, 2009). It is also explanatory, as it seeks to make something intelligible, justifying the reasons and clarifying which factors contribute in some way to the occurrence of a particular phenomenon (Vergara, 2016).

To achieve its objectives, the research will be approached quantitatively, as statistical instruments will be employed both in data collection and treatment (Raupp & Beuren, 2006).

Among the technical procedures, the study is defined as survey research, as it will describe, quantitatively, the trends of a population (Creswell, 2010). It is also characterized by the direct questioning of people whose behavior is to be known and/or investigated (Richardson, 2008).

Another feature is that phenomena occurring naturally will be studied; in this case, it concerns the relationships between the use of the performance measurement system, risk management practices, and accountability (Martins & Theóphilo, 2009).

Creswell (2010) further adds that survey research should include the following components: population and sample, formulated research hypotheses, construct and research design, data collection instrument, data collection and analysis procedures, and study limitations.

#### 3.2 CONSTRUCT AND RESEARCH INSTRUMENT

To ensure the validity of the questions and verify the accuracy of the constructs selected in Table 01, all items related to the constructs were extracted from the studies of Al-Tamimi and Al-Mazrooei (2007), Geer et al. (2008), and Henri (2006), and adapted after analyzing the work of Rasid et al. (2019). The research instrument adopted was a questionnaire with 21 closed-ended questions.

# Table 1

**Constructs** 

INVESTIGATED VARIABLE	ITEM	DESCRIPTION	BIBLIOGRAPHY	
Deufermenne Mass	Moni_1	To track progress towards goals		
Performance Meas-	Moni_2	To review key performance measures		
use for monitoring	Moni_3	To compare results with expectations	<b>TT T T T T T T T T </b>	
use for monitoring	Moni_4	To monitor results	Henri (2006);	
	Aten_1	To focus on critical success factors	(2019).	
urement System -	Aten_2	To allow discussion in meetings of superiors, sub- ordinates and peers	Nitzl et al., (2019)	
tention	Aten_3	To discuss underlying results, assumptions and action plans		
	Risk_1	Systematic risk identification		
	Risk_2	Changes in risk are recognized with functions	-	
	Risk_3	Procedures for systematic identification of invest- ment opportunities		
	Risk_4	Evaluates the probability of risk		
Risk Management –	Risk_5	Evaluates risk using qualitative analysis methods	Al-Tamimi and Al- Mazrooei (2007);	
practices	Risk_6	Analyzes and evaluates opportunities	Rasid et al., (2019)	
	Risk_7	Evaluates the cost and benefits of dealing with the risk		
	Risk_8	Monitors the effectiveness of Risk Management		
	Risk_9	The level of risk control is appropriate		
	Risk_10	Reporting and communication processes support Risk Management		
	Acco_1	Evaluate the efficiency and effectiveness of its service		
Accountability	ntability         Acco_2         Responses to complaints           Acco_3         Reviews mission and objectives frequently		Geer et al. (2008); Rasid et al., (2019)	
	Acco_4	Written conflict of interest policy		

The measures for Risk Management practices and accountability were adapted from Al-Tamimi and Al-Mazrooei (2007) and Geer et al. (2008), respectively, while the measures for the use of the Performance Measurement Systems were adapted from Henri (2006). The choice of these measures took into account the work of Rasid et al. (2019), who also opted for these measures after an extensive literature review on Risk Management, Performance Measurement Systems, and accountability in the public sector.

Considering that, in this study, the questioning was directed at managers or those responsible for Risk Management in each institution, it is expected that a formal system of performance measurement, Risk Management, and accountability exists, along with frequent exposure to audits by control bodies such as CGU and TCU.

Regarding the indicators used to measure the use of the Performance Measurement System, a 5-point Likert scale was employed, where 1 represents the lowest degree of use and 5 the highest degree of use. Respondents were asked to indicate the extent to which top management used the system for monitoring (such as tracking progress toward goals, reviewing performance measures, comparing results with expectations, and monitoring outcomes) and focus of attention (such as concentrating on critical success factors, enabling discussion in meetings, and debating results and plans).

As for Risk Management practices, the questions included: (1) risk identification (whether organizations conduct systematic risk identification and develop procedures for identifying opportunities or changes in risk), (2) risk assessment (whether the organization assesses risk probability, uses qualitative methods, analyzes opportunities, and considers costbenefit analysis), and (3) risk monitoring (whether the organization monitors the effectiveness of Risk Management, whether risk control is appropriate, and whether organizational reports support Risk Management). Again, a 5-point Likert scale was used, where 1 represents the lowest degree of agreement and 5 the highest degree of agreement. Respondents were asked to indicate their level of agreement regarding Risk Management practices in their institution.

For accountability, the indicators measure: (i) the organization's effort to evaluate the efficiency and effectiveness of services, (ii) the handling of complaints, (iii) the maintenance of a clear mission or objective, and (iv) the existence of a conflict of interest policy. Once again, a 5-point Likert scale was used, where 1 represents the lowest degree of agreement and 5 the highest degree of agreement. Respondents were asked to indicate their level of agreement regarding the occurrence of accountability in their institution.

#### 3.3 POPULATION AND SAMPLE

In this study, the chosen population was the public sector of the federal executive branch, specifically public institutions of direct administration (ministries) and indirect administration (autarchies, foundations, public companies, and mixed-economy societies).

The selection of this group of institutions was based on their fulfillment of several specifications (Sampieri et al., 2013) or their possession of certain characteristics (Richardson, 2008). In this research, the most important characteristic is the obligation to comply with MP/CGU No. 01 of 2016.

As the focus of this study is on Risk Management practices, it is assumed that these institutions comply with the Regulatory Instruction and, consequently, have adopted Risk Management, along with its performance monitoring and accountability mechanisms.

To define the population, the number of institutions was sought from the Federal Government Institutional Organization and Innovation System, from the portuguese *Sistema de Organização e Inovação Institucional do Governo Federal* (SIORG). This system provides information on the hierarchical structure of federal public administration as well as the names and acronyms of the institutions. Additional information had to be consulted from other documents.

The IGG report was another document consulted. Although the IGG - 2024 is still in the data compilation phase and is not available for consultation, the IGG - 2021 (the most recent) was used to draw conclusions about the institutions that implemented a formal Risk Management structure. The analysis revealed that 287 institutions had adopted and practiced Risk Management to some extent.

It was also observed that these institutions possess a complete organizational structure, with more than 100 employees. This criterion ensures that a formal performance measurement system (Henri, 2006) and Risk Management are being practiced (Rasid et al., 2019).

The key respondents for this study include governance managers and/or advisors, risk managers, strategic planning managers, and internal auditors. Therefore, the population consisted of 287 federal public institutions distributed across 39 ministries (or equivalents) representing direct public administration, and 248 entities representing indirect administration. A total of 287 self-administered questionnaires were distributed to respondents via their institutional emails.

Regarding the sample, some exclusion criteria for responses were defined to ensure data quality. The first criterion was to select only one respondent to represent their organization,

except in cases of a branch or decentralized unit. The second criterion was to eliminate incomplete responses (Hair et al., 2009). Finally, responses that exhibited a consistent pattern—where the same answer was marked across all items—were excluded (Meade & Craig, 2012).

The calculation for the appropriate sample size, aimed at the statistical power of the analysis, was performed using the G\*Power software. For this calculation, the criteria established by Faul et al. (2007) were utilized based on the predictor variables (performance measurement system for monitoring and for focus of attention) regarding the variable of Risk Management practices. A medium effect size of 0.15 was defined, with a sample power of 1- $\beta$ =0.8 and a significance level of  $\alpha$ =0.05. Consequently, based on these criteria, it was established that at least 68 responses were expected for the evaluation of the theoretical model.

Data collection lasted four months, during which 194 organizations responded to the questionnaire, indicating a response rate of 67 percent. However, after applying the exclusion criteria, 22 repeated responses, 1 incomplete response, and 4 responses with a consistent pattern were discarded, totaling 28 unusable responses. Even after these exclusions, the final usable sample still consisted of 166 responses, a sufficient number to confirm the appropriate size for the analyses conducted.

Thus, the sample for the study consisted of 166 Brazilian Federal Public Institutions, with 21 representing direct administration and the remaining 146 representing indirect public administration.

#### 3.4 RESEARCH PRE-TEST

Several original items related to Risk Management practices and credit risk analysis specified for the banking environment were eliminated to adapt to the public sector context, as done by Rasid et al. (2019).

After this adjustment, the research questionnaire (Appendix A) was registered on Google Forms to conduct a pre-test and assess the need for further adjustments to better align with the specific objectives and suitability for the method to be applied. The pre-test was sent to five public servants working in institutions with a formal Risk Management structure and possessing experience in Risk Management. Subsequently, the responses and feedback were analyzed. Only a few adjustments were made, and when they occurred, it was aimed at improving the understanding of the questions, considering that they were translated from another language.

### 3.5 DATA GATHERING PROCEDURES

The data collection phase involves the development of a detailed plan of procedures to gather data with the aim of fulfilling the research objectives (Sampieri et al., 2013).

Thus, based on the selected population, contacts (phone and email) of public servants with the appropriate profile fitting the sample were sought from the official websites of these institutions. Data were collected through a survey, with the link provided via Google Forms sent by email.

The data collection lasted for a period of four months, from March to June 2024. During this period, there were strikes in many institutions that are part of the focus of this study, so the Integrated Ombudsman and Information Access Platform (*Plataforma Integrada de Ouvidoria e Acesso à Informação*)– Fala.BR was also used to send the questionnaire.

### 3.6 PROCEDURES FOR DATA PROCESSING AND ANALYSIS

For data processing and analysis planning, Microsoft Excel 365 and the statistical software Smart PLS 4 were used, employing PLS (Partial Least Squares) – SEM (Structural Equation Modeling), also known as MEE (*Modelagem de Equações Estruturais*) or Partial Least Squares.

The techniques followed this outline: (i) tabulation and coding of the database; (ii) statistical and descriptive analysis with frequency determination of the data set; (iii) Confirmatory Factor Analysis (CFA); and (iv) Structural Equation Modeling (SEM).

After tabulating and coding the collected responses, the data were entered into the SmartPLS 4 software. The variables were organized according to their nature, whether ordinal or nominal. Subsequently, all variables underwent descriptive statistics, including frequency extraction and percentages.

To measure the reliability and validity of both the measurement and structural models, Descriptive Statistics were applied, specifically frequency distribution, CFA, and SEM, with the theoretical basis drawn from the studies of Hair et al. (2014) and Ringle et al. (2014).

Following descriptive analysis, the next step was the CFA, as indicated by Botelho and Zouain (2006), which requires examining interrelationship patterns among constructs (latent variables). The CFA allows testing whether measured variables adequately represent a smaller number of constructs, specifying the number of factors within a variable set and the high load of each variable on a particular factor before results can be computed (Hair et al., 2009).

CFA consists of three stages: 1) qualitative-preparatory, aimed at better defining indicators for each construct; 2) quantitative-preparatory, focusing on item purification and reduction; and 3) quantitative-descriptive-conclusive, which includes data collection to evaluate construct validity and relationships according to the proposed model (Botelho & Zouain, 2006).

After the factor analysis, the research applied hypothesis testing through Structural Equation Modeling (SEM). SEM can be conducted using two techniques: (i) covariance-based (CB-SEM), primarily used for confirming or rejecting theories, aiming to minimize the difference between observed and expected covariance matrices (Hair Jr et al., 2014; Hair Jr et al., 2016); and (ii) partial least squares (PLS-SEM), more commonly used for theory development, which maximizes the explained variance of endogenous constructs (Hair Jr et al., 2014; Hair Jr et al., 2016).

PLS-SEM involves the simultaneous evaluation of multiple variables, defined after factor analysis, and their relationships (Hair Jr et al., 2014; Ringle et al., 2014). Correlations between constructs and their measured variables are calculated, followed by linear regressions between constructs (Hair Jr et al., 2016; Ringle et al., 2014). Table 02 presents the criteria used in the evaluation of the measurement model.

#### Table 2

Model Quality				
Indicator	Expected Value	Bibliography		
Average Variances Extracted (AVE)	Above 0.5	Hair et al. (2014)		
Compound reliability ( <i>Confiabilidade Composta</i> - CC)	Above 0.7	Hair et al. (2014)		

Acceptance Criteria

1	-		1
Cronbach's alpha (AC)	Above 0.7		Hair et al. (2014)
Hyj	pothesis Test		
Indicator	Exp	ected Value	Bibliography
Path Coefficient (β)	Bigg	ger than 0.1	Wong (2013)
	high	Above 0.26	Cohen (1988)
Determination Coefficient (R <sup>2</sup> )	moderate	Above 0.13	Cohen (1988)
	low	Above 0.02	Cohen (1988)
Predictive Relevance (Q <sup>2</sup> )	Big	gger than 0	Hair et al. (2014)
	small	Above 0.02	Cohen (1988)
Effect size (f <sup>2</sup> )	medium	Above 0.15	Cohen (1988)
	large	Above 0.35	Cohen (1988)

For hypothesis testing and significance analysis of the relationships (p-value) between variables in the structural model, the Bootstrapping procedure was utilized (Ringle et al., 2014). This included verifying the mediation of Risk Management in the relationship between the uses of the Performance Measurement System and accountability. Hair Jr et al. (2014) emphasize that mediation focuses on the theoretically established direct path relationship, as well as an additional component that can provide insights into the direct effect through its indirect effect.

Finally, an Importance-Performance Map Analysis (IPMA) was conducted to extend the results obtained from the PLS-SEM application and gain further insights by merging the analysis of the importance and performance dimensions of the constructs and the indicators of the model (Ringle & Sarstedt, 2016). The IPMA allows for identifying areas where action is needed, meaning it can pinpoint parts of the process with relatively high importance but low performance. This identification facilitates the implementation of corresponding management tools that lead to improvements (Sternad Zabukovšek et al., 2022).

## 4 ANALYSIS AND DISCUSSION OF RESULTS

### 4.1 RESPONDENTS' DEMOGRAPHIC DATA

This study aims to investigate the relationships between the use of the Performance Measurement System, Risk Management practices, and accountability. Since the focus is on the Risk Management practices within Brazilian federal public institutions, it is assumed that these institutions have a formal structure that also encompasses the governance mechanisms that support this management.

In the research, respondents were asked to provide information regarding gender, age, education, role, and length of experience in Risk Management. Table 3 presents the demographic information of the respondents.

### Table 3

Demographic	Frequency (n=166)	Percentage (%)
Gender		
Feminine Masculine	65 101	39.16 60.84
Age		
Between 21 and 40 years old Between 41 and 60 years old > 60 years old	69 90 7	41.57 54.22 4.22
Education		
Administration Accounting Sciences Law Economy Engineering IT Others	48 25 14 11 16 10 42	28.92 15.06 8.43 6.63 9.64 6.02 25.30
Role at the Institution		
Governance Manager, Risks, Compliance Governance Advisor, Risks, Compliance Planning Manager Other leadership roles	76 37 23 17	45.78 22.29 13.86 10.24
Internal Auditor	6	3.61

Demographic Information

No leadership role	7	4.22
Length of experience in Risk Management		
Up to 2 years	63	37.95
3-4 years	36	21.69
5-6 years	24	14.46
> 6 years	43	25.90

The data shows that the respondents are predominantly male (61%), with ages ranging from 41 to 60 years (54%). Most have degrees in Administration or Accounting (44%), primarily work in Risk Management (68%), and their tenure in the role does not exceed six years (71%).

# 4.2 DESCRIPTIVE STATISTICS OF CONSTRUCTS

Table 4 displays the mean scores and standard deviations for all constructs, including the use of the Performance Measurement System, Risk Management practices, and accountability constructs. The mean scores for the items across the constructs ranged from a lower limit of 2.90 to an upper limit of 4.37, while the standard deviations varied from 0.831 to 1.262.

In the survey, respondents were asked to indicate the use of information from the Performance Measurement System in their institutions for each of its dimensions. The overall mean of 3.42 for monitoring the use of the Performance Measurement System indicates that the information was used moderately for monitoring, with the best results observed in the indicators "monitor the results" (mean 3.52) and "track progress towards goals" (mean 3.43).

The overall mean below 4,00 for the dimension of attention to the use of Performance Measurement Systems also indicates that the information from these systems has been moderately used in federal public institutions, with emphasis on the indicator "discuss results and action plans" (mean 3.34). Thus, it can be assumed that the use of Performance Measurement Systems for various purposes may encourage Risk Management practices within Federal Public Institutions.

The respondents expressed their agreement on Risk Management practices, which included detailed activities involved in the process of identifying, assessing, and monitoring risks. The overall mean in the identification phase indicated that Risk Management was moderately practiced in Federal Public Institutions, with greater emphasis on systematic risk identification (mean 3.48) and recognition of risk changes (mean 3.43). Procedures developed for the identification of risks and opportunities were less frequently carried out as activities (mean 2.90).

# Table 4

CONSTRUCTS	ITEMS	MEAN	STAN- DARD DE- VIATION	OVE- RALL MEAN
Deufermennen Mennen				
ment System	Tracks progress towards goals.	3 4 2 8	0.927	
ment bystem	Reviews key performance measures:	3.404	0.925	3.423
use for monitoring	Compares results with expectations:	3.337	0.948	01120
	Tracks results.	3.524	0.923	
Performance Measure-				
ment System	Focuses on critical success factors;	3.151	0.986	
5	Allows discussion in meetings;	3.325	1.007	3.271
use for attention focus	Discusses results and action plans.	3.337	0.979	
Risk Management	Systematic risk identification;	3.482	1.074	
identification	Changes in risk are recognized;	3.428	1.077	3.269
practice	Identification of risks and opportunities.	2.898	1.09	
Risk Management	Evaluates the probability of risk;	3.964	1.103	
evaluation	Evaluates risk using qualitative analysis;	4.127	1.14	3.782
practice	Analyzes and evaluates opportunities; Evaluates the cost/benefits of dealing with	3.657	1.06	
	the risk.	3.38	1.12	
	Monitors the effectiveness of Risk Manage-			
Risk Management	ment;	3.217	1.2	
monitoring	The risk control level is appropriate;	3.325	1.05	3.271
practice	Formal Risk Management Communication.	3.271	1.15	
	Evaluates the efficiency and effectiveness			
	of the service;	3.554	0.95	
Accountability	Replies to complaints;	4.367	0.83	3.992

# Constructs Descriptive Statistics

Frequently reviews mission and objectives;	4.265	1.01
Written conflict of interest policy.	3.783	1.26

In the risk assessment phase, the overall mean also indicated moderate practice. Despite this, senior management strongly agreed with the use of the qualitative method to assess the identified risks (mean 4.13) in Federal Public Institutions. Less emphasis was placed on evaluating the cost/benefits of managing risk (mean 3.38).

In the risk monitoring phase, top management gave the highest score to the "appropriate risk control level" indicator (mean 3.32). The lowest score was given to "monitors the effectiveness of Risk Management" (mean 3.22). Therefore, these results support the assumption that Risk Management is moderately practiced in Federal Public Institutions, although it is a sophisticated and costly control system, more likely to be used by profit-oriented commercial sectors.

Respondents were asked to indicate their perception of organizational accountability, and the global mean value of 3.99 suggests that it is strongly practiced in Federal Public Institutions. Two items scored above the average value and were highly emphasized in these institutions. These encompass responses to service-related complaints (mean 4.37) and clear missions and objectives (mean 4.26).

It was noted that less emphasis was placed on evaluating the efficiency and effectiveness of their service (mean 3.55). Therefore, organizational accountability is an important feature in the public sector, often sought by stakeholders for accountability and receiving great emphasis from oversight bodies.

#### 4.3 MEASUREMENT MODEL EVALUATION

The final usable samples included for analysis comprise 166 respondents, which is adequate for executing PLS-SEM (Partial Least Squares Structural Equation Modeling). The reflective measurement model was chosen to model the relationship between measures and the first-order latent construct, after meeting the specified criteria (Jarvis et al., 2003; Hair et al., 2014). The constructs used for this study were tested for convergent validity, based on factor loadings, composite reliability (CR), and average variance extracted (AVE) (Hair et al., 2014).

### Table 5

Factor Loadings

			Performance Mea	asurement Systems
	Accountability	Risk Management Practices	Use for Attention Fo- cus	Use for Monitoring
Acco_1	0.835			
Acco_2	0.819			
Acco_3	0.651			
Acco_4	0.580			
Aten_1			0.908	
Aten_2			0.929	
Aten_3			0.929	
Moni_1				0.937
Moni_2				0.944
Moni_3				0.939
Moni_4				0.942
Risco_1		0.839		
Risco_2		0.863		
Risco_3		0.731		
Risco_4		0.828		
Risco_5		0.732		
Risco_6		0.779		
Risco_7		0.811		
Risco_8		0.869		
Risco_9		0.842		
Risco_10		0.834		

The factor loadings for most of the construct items exceeded the ideal value of 0.708 (Hair et al., 2014), with the exception of two items from the accountability construct: Acco\_3 - Frequently reviews mission and objectives (0.651), e Acco\_4 - Written conflict of interest policy (0.580). Given this, tests were conducted to exclude variables until all quality indicators improved. The best solution found was to exclude the indicator Acco\_4 (Written conflict of interest policy), keeping the indicator Acco\_3 (Frequently reviews mission and objectives), which has a value below the ideal.

Hair et al. (2009) acknowledge that standardized loadings should be 0.5 or higher, ideally 0.7 or above, but they note that in cases where loadings are below 0.7, they can still be considered significant, despite more error variance than explained variance in the measure's

variance. Thus, by analyzing other quality indicators and the reliability of the indicators, all items were found to be at a satisfactory level.

Table 6 presents the composite reliability (rho\_c) for monitoring the use of the Performance Measurement System (0.959), highlighting the use of the Performance Measurement System (0.945), risk management practices (0.951), and accountability (0.815). The Composite Reliability values recorded between 0.80 and 0.99 indicated that there was internal consistency among the items and the constructs they represented. As a result, the items used in the study were considered reliable measures.

# Table 6

	Alfa de Cronbach	Compound reliabi- lity (rho_a)	Compound reliabi- lity (rho_c)	Average variance extracted (AVE)
Accountability	0.672	0.721	0.815	0.597
Risk Management Practices	0.943	0.948	0.951	0.663
Use for Attention Focus	0.912	0.917	0.945	0.850
Use for Monitoring	0.936	0.938	0.959	0.887

Construct Validity and Reliability

As seen in Table 6, the evaluation of the average variance extracted (AVE) for each construct displayed an AVE value above the threshold of 0.5. Therefore, the measurement model in this study established adequate convergent validity, and all items from the three constructs are considered valid measures.

## Table 7

Intercorrelation Matrix (Fornell-Larcker Criteria)

	Accountability Risk Managem		Use for	Use for
	necountaonity	Practices	Attention Focus	Monitoring
Accountability	0.773			
Risk Management Practices	0.563	0.814		
Use for Attention Focus	0.559	0.675	0.922	
Use for Monitoring	0.541	0.63	0.838	0.942

Note: The diagonal values (bold) represent the square root of the AVE and the off-diagonal values show the correlations.

The discriminant validity of the measurement model was evaluated based on two techniques: (1) Fornell-Larcker criterion and (2) cross-loadings. Table 7 displays the results of the square roots of the AVE and the off-diagonal values, which show the intercorrelation between the constructs. The results indicated that the square roots of the AVE (bold) of all constructs exceeded their correlations with the other constructs (off-diagonal values), thus meeting the Fornell-Larcker criterion.

Simultaneously, the cross-loading results indicated that all measurement indicators had a higher loading on their own construct compared to other constructs. Based on the results of both techniques, the measurement model established its discriminant validity. In summary, the external measurement model is reliable and valid. Thus, the measurement model can be used to estimate the parameters of the internal structural model.

# 4.4 STRUCTURAL MODEL

The evaluation of the structural model validates the collinearity between the constructs, the coefficient of determination ( $R^2$ ), effect sizes ( $f^2$ ), predictive relevance ( $Q^2$ ), and the path coefficient ( $\beta$ ) (Hair et al., 2014).

First, collinearity between the predictor constructs was tested. An anomaly was identified in the values **moni\_1** (To track progress towards goals) and **moni\_2** (To review key performance measures), and to solve the issue, only the indicator **moni\_1** (To track progress towards goals) was excluded. After rechecking, the results were adequate for all items, as the variance inflation factor (VIF) was below 5. Therefore, the structural model was suitable for further evaluation.

Second, the coefficient of determination (R<sup>2</sup> value) was evaluated. Figure 4 indicates that the R<sup>2</sup> value for Risk Management practices is 0.482, while the R<sup>2</sup> value for accountability is 0.317. Both were significant at the probability level of 0.05.

### Figure 4

Structural Model



Caption: Uso do Sistema de Medição de Desempenho para Monitoramento: Use of Performance Measurement System for Monitoring; Uso do Sistema de Medição de Desempenho para Foco de Atenção: Use of the Performance Measurement System for Attention Focus; Práticas de Gestão de Riscos: Risk Management Practices.

The R<sup>2</sup> value indicates that the monitoring of the use of the Performance Measurement System, attention to the use of the Performance Measurement System, and Risk Management practices explained 31.7 percent of the variation in accountability (endogenous variable), while 48.2 percent of the variation in Risk Management practices was explained by the monitoring of the use of the Performance Measurement System and attention to the use of the Performance Measurement System.

# Table 8

# R-squared for endogenous variables

	<b>R-squared</b>	Adjusted R-squared
Accountability	0.317	0.313
Risk Management Practices	0.482	0.476

Based on Cohen (1988), the R-squared value for the endogenous latent variables above 0.26 is considered large. On the other hand, using the R<sup>2</sup> value to understand the model's

predictive accuracy can result in inherent bias, as even an insignificant exogenous construct will increase the  $R^2$  value. Therefore, the adjusted  $R^2$  value needs to be considered when comparing models (Hair et al., 2014). The adjusted  $R^2$  value recorded for Risk Management practices was 0.476, and for accountability, it was 0.313, both still considered large (Cohen, 1988).

Regarding the F-squared of the exogenous constructs (Table 9), Risk Management practices have an f<sup>2</sup> effect size of 0.464 to explain accountability, which is considered a large effect (Cohen, 1988). On the other hand, the exogenous construct, Performance Measurement System for monitoring, has an f<sup>2</sup> effect size of 0.052 to explain Risk Management, which is considered a small effect (Cohen, 1988). Moreover, the exogenous construct, Performance Measurement System for attention focus, has an f<sup>2</sup> effect size of 0.102 to explain Risk Management, and in terms of effect size, it is classified between small to moderate (Cohen, 1988).

This means that attention to use is more important than monitoring the use of the Performance Measurement System in explaining the variation in Risk Management practices. These effects were considered small, which is common for exogenous constructs in explaining endogenous variables (Cohen, 1988).

#### Table 9

F-squared for effect sizes

	Accountability	Risk Management Practices
Risk Management Practices	0.464	
Performance Measurement Systems use for Attention Focus		0.102
Performance Measurement Systems use for Monitoring		0.052

Third, the cross-validated redundancy results, as shown in Figure 4, indicate that the Q<sup>2</sup> value, both for accountability (0.287) and Risk Management practices (0.465), was above zero. This suggests that the model has predictive relevance.

Fourth, after evaluating the  $R^2$  values and  $Q^2$  values, the path coefficient was assessed to further validate the structural model and the proposed hypotheses. According to Hair et al. (2011), the path coefficient value that impacts the structural model should be at least 0.1. Table 10 shows the results of the structural model estimation, detailing the path coefficients, standard deviation, and t-statistics for all the hypothetical paths. It is noted that the path coefficient value ranges from 0.301 to 0.563, with positive and significant signs for the 3 tests conducted.

#### Table 10

Structural Estimates for Hypothesis Testing

	Path Coeffici- ent (β)	Standard de- viation	Statistics T	Values of p
Risk Management Practices $\rightarrow$ Accountability	0.563	0.050	11.297	0.000
Performance Measurement Systems use for Atten- tion Focus $\rightarrow$ Risk Management Practices	0.422	0.108	3.918	0.000
Performance Measurement Systems use for Monito- ring $\rightarrow$ Risk Management Practices	0.301	0.114	2.653	0.008

In the first hypothesis test, based on the analysis, Risk Management practices were directly affected by the use of the Performance Measurement System for monitoring ( $\beta = 0.301$ , t = 2.653, p < 0.01). Thus, **hypothesis H1A was confirmed**.

In the second test, Risk Management practices were also directly affected by the use of the Performance Measurement System for attention ( $\beta = 0.422$ , t = 3.918, p < 0.01). Therefore, **hypothesis H1B was also confirmed**.

In the third test, accountability is directly affected by Risk Management practices ( $\beta = 0.563$ , t = 11.297, p < 0.01). This suggests that Risk Management practices were positively related to accountability and were statistically significant. As a result, **H2 was also confirmed**.

Fifth, the structural model was examined regarding the mediating effect. This study proposed the mediating effect of Risk Management practices on accountability through hypotheses H3a and H3b. Since the use of the Performance Measurement System for monitoring and the use of the Performance Measurement System for focusing attention were directly related to Risk Management practices and, at the same time, Risk Management practices were directly related to accountability, the mediating effect of Risk Management practices can be assessed (Preacher & Hayes, 2008).

Therefore, bootstrap calculations for the indirect effect were conducted, and the results revealed, as shown in Table 11, that there was a positive indirect effect of the Performance Measurement System for monitoring on accountability ( $\beta = 0.170$ , t = 2.473, p < 0.05). There was also a positive indirect effect of the Performance Measurement System for attention focus on accountability ( $\beta = 0.238$ , t = 3.706, p < 001). Therefore, **hypotheses H3a and H3b were also confirmed.** 

#### Table 11

Indirect Effect

	Original sample (O)	Sample mean (M)	Standard de- viation (STDEV)	Statistics T ( O/STDEV )	Values of P
Performance Measurement Systems use for Attention Fo- cus $\rightarrow Accountability$	0.238	0.241	0.064	3.706	0.000
Performance Measurement Systems use for Monitoring $\rightarrow$ <i>Accountability</i>	0.170	0.173	0.069	2.473	0.013

After the evaluation of the structural model, the Importance-Performance Map (IPMA) was used with the assistance of the SmartPLS4 software, combining the analysis of importance and performance dimensions. Figure 5 shows both dimensions of the constructs that influence the dependent variable Accountability.

## Figure 5

IPMA of Constructs



Caption: Mapa de desempenho de importância: Importance performance map; Desempenho: Performance; Importância (efeitos totais): Importance (total effects); Práticas de Gestão de Riscos: Risk Management Practices; Uso para Foco de Atenção: Use for Attention Focus; Uso para Monitoramento: Use for Monitoring.

The IPMA results are presented in a two-dimensional graph, where the horizontal axis describes the "importance" (total effect) of the influencing factors, using a scale from 0 to 1, while the vertical axis describes their performance on a scale from 0 to 100.

The most important construct for predicting Accountability was "Risk Management Practices" (0.563), indicating that changes in it have the greatest direct impact on Accountability. The construct showed a performance of 61.418, which is considered a moderate result, but, given that it is the most important construct, improving its performance could have a significant impact on Accountability.

The Performance Measurement System showed, in the construct of its use for Attention Focus (0.238), moderate importance, while its use for monitoring (0.170) has the least importance, but is still relevant to Accountability. The use for Monitoring (60.564) is performing slightly below Risk Management Practices, while the use for Attention Focus

(56.626) has the lowest performance among the constructs, indicating a potential area for improvement.

# Figure 6



# IPMA of Indicators

Caption: Mapa de desempenho de importância: Importance performance map; Desempenho: Performance; Importância (efeitos totais): Importance (total effects);

The indicators related to Risk Management Practices show importance values ranging between 0.051 (Risk\_05) and 0.085 (Risk\_06). Risk\_06 (analyzes and evaluates the opportunities you have to achieve goals), Risk\_07 (Evaluates the cost and benefits of dealing with the risk), Risk\_08 (Monitors the effectiveness of Risk Management), Risk\_09 (The risk control level is appropriate) and Risk\_10 (reporting and communication processes support Risk Management) have the greatest effects, suggesting that they are crucial for the impact of Risk Management Practices on Accountability.

The performance of Risk Management Practices indicators varies widely. Risk\_03 (systematic identification of investment opportunities) has the lowest performance (47.440), while Risk\_05 (evaluates risk using qualitative analysis methods) has the highest (78.163).

Indicators such as Risk\_04 (evaluates the probability of risk), Risk\_05 (evaluates risk using qualitative analysis methods) and Risk\_06 (analyzes and evaluates opportunities) have good performance, which is positive considering the importance of Risk Management Practices. However, Risk\_03 (systematic identification of investment opportunities) stands out as a critical point for improvement.

The indicators related to the Performance Measurement System, in its use for Attention Focus, show that the importance of Aten\_1 (To focus on critical success factors), Aten\_2 (To allow discussion in meetings of superiors, sub-ordinates and peers), and Aten\_3 (To discuss underlying results, assumptions and ac-tion plans) are close, varying from 0.081 to 0.094. They have considerable importance, especially Aten\_1 (To focus on critical success factors), which has the greatest impact.

On the other hand, the indicators for monitoring use have lower importance, with Moni\_2 (To review key performance measures), Moni\_3 (To compare results with expectations) and Moni\_4 (To monitor results) ashowing total effects ranging between 0.058 and 0.063. This reflects the overall lower importance of the construct in the model.

The performance of the indicators for Attention Focus, Aten\_1 (To focus on critical success factors), Aten\_2 (To allow discussion in meetings of superiors, sub-ordinates and peers) e Aten\_3 (To discuss underlying results, assumptions and ac-tion plans), is more balanced, but all are below the average performance of the monitoring use. This suggests that improvements are also needed, particularly for the indicator Aten\_1. In the monitoring use indicators, there is also room for improvement, especially for indicators Moni\_2 and Moni\_3.

# 4.5 ANALYSIS AND INTERPRETATION OF THE RESULTS

The results of the hypothesis test indicated a positive relationship between the use of the Performance Measurement System for monitoring and Risk Management practices. This conclusion suggests that the use of the Performance Measurement System for monitoring on a larger scale in Federal Public Institutions enables the collection and analysis of data in real-time or at regular intervals. This provides a clear view of performance (Henri, 2006), which can aid in the early identification of risks (Arena & Arnaboldi, 2014).

Thus, the Performance Measurement System provides precise strategic information and key areas of results that need to be focused on to achieve organizational objectives. However, potential risks and uncertainties in the environment can hinder the realization of the planned objectives. Therefore, the use of the Performance Measurement System to monitor the achievement of organizational strategic objectives could trigger the identification of risks to determine their causes. These risks could impede the achievement of goals (Beasley et al., 2006).

The conclusions of this study partially support Henri's (2006) findings by indicating that the Performance Measurement System for monitoring is a conventional type of control system that represents the basic management activities carried out within an organization.

However, many Federal Public Institutions have adopted specific software for Risk Management, such as ÁGATHA and FORRISCO. This factor aligns with the findings of Calandro and Lane (2006), who recommended keeping risk scorecards separate from performance scorecards due to their differing measurement characteristics. Nevertheless, the positive relationship between the Performance Measurement System for monitoring and Risk Management practices was confirmed.

Another important finding of this study suggests that the use of the Performance Measurement System to focus attention in Federal Public Institutions intensely influences risk assessment. When the Performance Measurement System is used to focus attention, it directs managers to critical or problematic areas identified (Henri, 2006) with the aid of performance indicators. This facilitates a more focused and detailed assessment of how to manage risks in those specific areas.

The use of the Performance Measurement System for attention in those organizations involved both a focus on critical success factors and the signaling of these factors and their respective goals, but critical success factors may fail due to potential risks and unrecognized uncertainties. In this regard, Risk Management acted as a central mechanism through which the Performance Measurement System fulfills its role of reducing uncertainty (Kominis et al., 2022).

In Federal Public Institutions, IN-01-2016 made the implementation of Governance and Risk and Control Committees mandatory where no equivalent structure existed. As objectives are measured through KPIs or performance measures associated with each objective, the origin of identified risks needs to be assessed in these committee meetings to decide on the risk treatment plan (Loosemore et al., 2005).

Therefore, it can be concluded that Federal Public Institutions using the Performance Measurement System to focus attention were more likely to accurately assess the risks associated with their critical success factors and objectives. This conclusion also supports Risk Management as an integration concept, aimed at capturing uncertainties and translating them into daily practices within an organizational context (Bracci et al., 2022).

The results of this study emphasize the strong positive relationship between Risk Management practices and accountability. This suggests that the practices of identifying, assessing (highlighted), and monitoring risks are important for promoting accountability in Federal Public Institutions. Thus, it can be concluded that risk management leads to better public sector accountability, as demonstrated by Rasid et al. (2019).

The preparation of a comprehensive risk list derived from managers of different departments provided information on risks for stakeholders to make better decisions. This result corroborates the finding that Risk Management is relevant as an accountability tool (Palermo, 2014).

Another important discovery concerns governance indices, such as the IGG conducted by TCU. The results of this study suggest that an increase in the indicator of Risk Management practices may positively impact the accountability indicator. The conclusion of this paper is consistent with Yudiyanto and Ningsih (2023), who postulated that Public Institutions with higher scores on the Risk Management implementation index would have implications for higher accountability scores.

This study concluded that Federal Public Institutions that utilize information from the Performance Measurement System for various purposes place greater emphasis on Risk Management practices to improve accountability. This means that increasing the use of the Performance Measurement System for monitoring and attention focus could enhance accountability through the implementation of Risk Management. The result of this work contributes to the existing theory by emphasizing the effects of Risk Management practices on accountability (Rasid et al., 2019).

The empirical result brings several important findings. First, it emphasizes the significant role of Risk Management practices as mediators in the relationship between the use of the Performance Measurement System and accountability. Therefore, the different uses of the Performance Measurement System (monitoring and attention focus) predict accountability both directly and indirectly through Risk Management practices.

Second, this study supports the findings of Rasid et al. (2019) with an important difference. The researchers found a greater indirect effect of the monitoring use on the accountability of public institutions in Malaysia. In the Brazilian context, the strongest effect was observed in the attention focus use. This result implies, therefore, that the mediating role of Risk Management practices in promoting accountability in Public Institutions is fundamental.

Third, Federal Public Institutions with a greater use of the Performance Measurement System for attention focus would require more Risk Management practices to identify critical areas that need more assertive decision-making. Thus, Risk Management practices with high levels of Performance Measurement System usage for attention focus could help institutions improve accountability. This finding is consistent with the study of Soin et al. (2014), which pointed out that the pressure for greater accountability linked Risk Management to Management Control, and its function is to protect it.

Finally, the analysis of IPMA revealed which indicators deserve attention in each construct, such as Risk\_03 (Risk Management Practices) and Aten\_1 (To focus on critical success factors). The results show that these indicators represent critical areas for intervention by public managers, and improving them could significantly increase accountability performance.

This study has some limitations that must be considered. First, the quantitative investigation limits the investigation process in terms of understanding the feelings, impressions, and viewpoints of respondents. Thus, deepening research into behavioral aspects should be the focus of attention in future research on Risk Management. Future research should adopt the viewpoint that Risk Management is complex and may require multiple investigations to understand its reality.

Second, this study utilized a cross-sectional design, in which data was collected from Federal Public Institutions (central government and decentralized institutions) at a single point in time. One of the main weaknesses of cross-sectional studies is that they do not allow for firm conclusions about the causal direction of the relationships between exogenous and endogenous variables.

Therefore, future research should consider a longitudinal research design to examine the continuity of responses and track changes over time. This study could be expanded by examining other moderators, such as organizational culture and the properties of performance

measures within the same relationship. A study considering other spheres of government, such as State or Municipal, could analyze variations in Risk Management practices within those organizations and the impact of Risk Management practices on accountability.

### **5** FINAL CONSIDERATIONS

This research investigated the relationship between the three subjects that literature has already pointed out as relevant for the functioning of public management: the Performance Measurement System, Risk Management, and accountability.

Accountability demonstrates its relevance as it is one of the pillars for improving public administration and democracy itself (Schommer et al., 2015), and enhancing it can reduce the risk of failure in public services (Tarek Rana & Rana, 2021). Moreover, in the public sector, accountability mechanisms are considered in the context of governance, including organizational structure and tools (Almquist et al., 2013).

There is relevance in Risk Management, as risk can interfere with an organization's efforts to achieve its objectives (Sobel & Reding, 2004), and managing it properly can improve the decision-making process under uncertainty, aiming to maximize benefits and minimize costs for society (Hinna et al., 2018).

Additionally, the Performance Measurement System provides performance measures to monitor progress toward achieving goals (Arena & Arnaboldi, 2014). For this reason, organizations are constantly concerned with finding better ways to measure, analyze, and report their activities to achieve better results (Choong, 2013).

Thus, this research aimed to address the following **research problem**: What is the relationship between Performance Measurement Systems, Risk Management practices, and accountability in Federal Public Institutions?

In light of this, the **general goal** of the research was to investigate the relationship between the use of Performance Measurement Systems, Risk Management practices, and accountability in Federal Public Institutions. To achieve this objective, data were collected on the uses of Performance Measurement Systems based on measures adapted from Henri (2006), Risk Management practices with measures adapted from Al-Tamimi and Al-Mazrooei (2007), and accountability according to the measures of Geer et al. (2008), which were analyzed through a survey.

Regarding the specific objectives, the conclusions were possible through the use of Structural Equation Modeling (SEM). To this end, reliability and validity tests of the construct were conducted using Cronbach's Alpha (CA), Composite Reliability (CR), and regarding convergent validity through Average Variance Extracted (AVE), where the test results were considered satisfactory concerning the construct. Through the use of SEM, it was possible to determine whether the hypotheses should be accepted or rejected.

The **specific goal "a"** refers to Investigating the relationship between the use of Performance Measurement Systems for monitoring and Risk Management practices in Federal Public Institutions. The findings demonstrate that there is a positive relationship between the use of the Performance Measurement System for monitoring and Risk Management practices, as supported by previous studies (Kominis et al., 2022; Rasid et al., 2019; Speklé & Verbeeten, 2014; Beasley et al., 2006; Calandro & Lane, 2006). In this hypothesis test, based on the analysis, Risk Management practices were directly affected by the use of the Performance Measurement System for monitoring. ( $\beta = 0.301$ , t = 2.653, p < 0.01). *Thus, hypothesis H1A was confirmed*.

In the **specific goal "b,"** To investigate the relationship between the use of Performance Measurement Systems for focus and Risk Management practices in Federal Public Institutions, the findings demonstrate that there is a positive relationship between the use of the Performance Measurement System for monitoring and Risk Management practices, as supported by previous studies (Kominis et al., 2022; Rasid et al., 2019; Speklé & Verbeeten, 2014; Beasley et al., 2006; Calandro & Lane, 2006). In the hypothesis test, Risk Management practices were also directly affected by the use of the Performance Measurement System for focus. ( $\beta = 0.422$ , t = 3.918, p < 0.01). *Therefore, hypothesis H1B was also confirmed*.

Regarding the **specific goal "c,"** which is To examine the relationship between Risk Management practices and accountability in Federal Public Institutions, the findings demonstrate that there is a positive relationship between the use of the Performance Measurement System for monitoring and Risk Management practices, as supported by previous studies (Yudiyanto & Ningsih, 2023; Rasid et al., 2019; Soin et al., 2014; Palermo, 2014; Rothstein et al., 2013). In this hypothesis test, accountability is directly affected by Risk Management practices. ( $\beta = 0.563$ , t = 11.297, p < 0.01). This suggests that Risk Management practices were positively related to accountability, being statistically significant. As a result, *H2 was also confirmed*.

In the **specific goal "d,"** To evaluate the mediation of Risk Management between the use of the Performance Measurement System for monitoring and accountability in Federal Public Institutions, the findings demonstrate that there is a positive relationship between the use of the Performance Measurement System for monitoring and Risk Management practices, as

supported by previous studies (Bracci et al., 2022; Tarek Rana & Rana, 2021; Rasid et al., 2019; Soin et al., 2014). The bootstrap was calculated for the indirect effect, and the results revealed that there was a positive indirect effect of the Performance Measurement System for monitoring on accountability. ( $\beta = 0.170$ , t = 2.473, p < 0.05). Therefore, *hypothesis H3a was confirmed*.

Regarding the **specific goal "e,"** To evaluate the mediation of Risk Management between the use of the Performance Measurement System for monitoring and accountability in Federal Public Institutions, the findings demonstrate that there is a positive relationship between the use of the Performance Measurement System for focus and Risk Management practices, as supported by previous studies (Bracci et al., 2022; Tarek Rana & Rana, 2021; Rasid et al., 2019; Soin et al., 2014). The bootstrap was calculated for the indirect effect, and the results revealed that there was a positive indirect effect of the Performance Measurement System for focusing attention on accountability. ( $\beta = 0.238$ , t = 3.706, p < 0.01). Thus, *hypothesis H3b was confirmed*.

This research presents several contributions by suggesting that organizational accountability can be improved through risk management practices, which are driven by the use of performance measurement systems, with the ultimate goal of achieving organizational objectives.

First, this study suggests that risk management practices can contribute to enhancing accountability in the federal public sector after investigating the relationship between risk management practices and accountability.

Second, this study contributes to theory by suggesting that among the drivers affecting the different processes of risk management, the construct of using performance measurement systems for monitoring and using performance measurement systems for focus should be considered.

Third, this paper also focuses on the indirect effect of risk management practices on accountability. The conclusions of this study suggest that with the proper use of performance measurement systems, risk management practices can contribute to better accountability in the public sector. This study incorporates variables drawn from previous studies, such as management control systems (i.e., performance measurement systems), accountability, and risk management.

Regarding practical contributions, this study provides public sector managers with new ways to enhance accountability in their organizations. In particular, it offers practical implications for the literature by providing guidance for professionals, decision-makers, managers, and auditors on appropriate risk management processes for different uses of performance measurement systems.

The results revealed that the use of performance measurement systems for monitoring and focus was more related to risk assessment, which is currently performed through qualitative assessments. However, this work suggests that a more sophisticated risk assessment method is needed in the public sector to meet strategic decision-making based on predefined performance measures or KPIs.

Public institutions should invest more in risk identification activities in order to identify all potential risks and opportunities related to their objectives, as this process can promote accountability.

Finally, the conclusions of this study could provide guidance to oversight bodies to improve the existing indicators of the Governance and Management Index (IGG), which are used to classify them and guide future audits.

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## **APPENDIX A – APPLIED RESEARCH QUESTIONNAIRE**

Dear participant,,

This questionnaire is part of a master's degree research (dissertation) on Risk Management in Brazilian Public Institutions. It aims to analyze the perception of those responsible for Risk Management on aspects such as performance measurement and accountability in these Institutions.

The questionnaire will take approximately 5 minutes to complete. Thank you for taking the time to help us with this study. The data collected will remain confidential and anonymous and will be used exclusively for academic purposes.

Student: Diego Soares Alves, UNILA employee and student of the professional master's program in administration at UNIOESTE.

Advisor: Dr. Vinicius Abilio Martins, professor of the professional master's program in administration at UNIOESTE.

Block 1 - Characterization of the respondent/organization

1.1 What is the name of the public institution you work for?

1.2 How would you rate your workplace?

- () Central Unit (headquarters, head office, presidency, rectory, etc.)
- ( ) Decentralized Unit (regional, branch, superintendence, campus, etc.)

1.3 How old are you?

( ) up to 20 years old ( ) 21-40 years old ( ) 41-60 years old ( ) over 60 years old

1.4 What is your gender?

( ) Masculine ( ) Feminine ( ) Another

1.5 What is your academic background?

() Administration () Accounting Sciences () Law () Economy () Another \_\_\_\_\_

1.6 What is your role at the institution?

() Planning Manager () Governance	, Risk, Compliance	Manager () Governance,	Risk, Compliance	Advisor ()
Internal Auditor () Another				

1.7 How long have you been working in Risk Management?

() up to 2 years () 3-4 years () 5-6 years () more than 6 years

Block 2 – Performance Measurement System

Rate the extent to which senior management currently uses performance measures:

2.1 to track progress toward goals

( ) Not at all ( ) Occasionally ( ) Moderately ( ) Strongly ( ) Very strongly

2.2 to review key performance indicators() Not at all () Occasionally () Moderately () Strongly () Very strongly

2.3 to compare results with expectations( ) Not at all ( ) Occasionally ( ) Moderately ( ) Strongly ( ) Very strongly

2.4 to monitor results

() Not at all () Occasionally () Moderately () Strongly () Very strongly

2.5 to focus on your critical success factors( ) Not at all ( ) Occasionally ( ) Moderately ( ) Strongly ( ) Very strongly

2.6 to allow discussion in meetings of superiors, subordinates and interested parties( ) Not at all ( ) Occasionally ( ) Moderately ( ) Strongly ( ) Very strongly

2.7 to discuss results, assumptions and implicit action plans( ) Not at all ( ) Occasionally ( ) Moderately ( ) Strongly ( ) Very strongly

Block 3 - Risk Management

3.1 The Organization conducts a comprehensive assessment and systematic identification of its risks relative to each of its stated goals and objectives

() Strongly Disagree () Mostly Disagree () Neither Agree nor Disagree () Mostly Agree () Strongly Agree

3.2 Changes in risk are recognized and identified in accordance with the Organization's roles and responsibilities () Strongly Disagree () Mostly Disagree () Neither Agree nor Disagree () Mostly Agree () Strongly Agree

3.3 This Organization has developed and applied procedures for the systematic identification of investment opportunities

() Strongly Disagree () Mostly Disagree () Neither Agree nor Disagree () Mostly Agree () Strongly Agree

3.4 This Organization assesses the likelihood of risks occurring

() Strongly Disagree () Mostly Disagree () Neither Agree nor Disagree () Strongly Agree () Strongly Agree

3.5 This Organization's risks are assessed using qualitative analysis methods (e.g., high, moderate, low)() Strongly Disagree () Strongly Disagree () Neither Agree nor Disagree () Strongly Agree () Strongly Agree

3.6 Your Organization analyzes and evaluates the opportunities it has to achieve objectives() Strongly Disagree () Strongly Disagree () Neither Agree nor Disagree () Strongly Agree () Strongly Agree

3.7 Your Organization's response to the risks analyzed includes an assessment of the costs and benefits of addressing the risks

() Strongly Disagree () Strongly Disagree () Neither Agree nor Disagree () Strongly Agree () Strongly Agree

3.8 Monitoring the effectiveness of risk management is an integral part of routine management reporting() Disagree Totally () Disagree to a large extent () Neither agree nor disagree () Agree to a large extent () Totally agree

3.9 The Organization's level of control is appropriate for the risks it faces

() Totally disagree () Disagree to a large extent () Neither agree nor disagree () Agree to a large extent () Totally agree

3.10 The reporting and communication processes within your Organization support effective risk management () Totally disagree () Disagree to a large extent () Neither agree nor disagree () Agree to a large extent () Totally agree

Block 4 - Accountability

4.1 Our assessments measure the efficiency and effectiveness of actions and/or service provision and the outcomes for stakeholders of these actions/services

() Totally disagree () Disagree to a large extent () Neither agree nor disagree

() Agree to a large extent () Totally Agree

4.2 In carrying out actions and/or providing services, the Organization acts with the utmost professionalism and treats the people served with respect, protecting confidentiality, having adequate procedures for handling complaints and regularly monitoring the satisfaction of those interested in these actions/services

() Totally Disagree () Largely Disagree () Neither Agree nor Disagree () Largely Agree () Totally Agree

4.3 The mission statement is reviewed every 3-5 years to determine whether the need for the actions and/or services continues to exist, whether new actions need to be developed and whether the mission needs to be modified to reflect changes in society

() Totally Disagree () Largely Disagree () Neither Agree nor Disagree () Largely Agree () Totally Agree

4.4 The organization has a written conflict of interest policy that applies to board members, staff, employees and volunteers.

() I completely disagree () I largely disagree () I neither agree nor disagree () I largely agree () I completely agree