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Determinants of Effective Risk Management Implementation: The Role of Organizational Culture as a Moderating Variable

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ABSTRACT

Risk management is essential in both private and public sectors to ensure financial stability and maximize stakeholder value. Despite Indonesia's National Medium-Term Development Plan mandating risk management in public organizations like the Ministry of Public Works and Housing (Ministry of PUPR), its implementation has faced challenges, including bribery and incomplete projects. This study examines the effects of human resources, budget allocation, and regulations on risk management effectiveness, with organizational culture as a moderating variable. Using a survey-based quantitative approach, data from employees in Echelon II Work Units at the Ministry of PUPR was analyzed through Structural Equation Modeling (SEM) with Partial Least Square (PLS). The findings reveal that human resources, budget, and regulations positively impact risk management effectiveness. However, organizational culture plays a mixed role, enhancing the impact of regulations while weakening the budget's effect and not significantly amplifying human resources on risk management. The study concludes that optimizing risk management requires focusing on human resources, aligning organizational culture with regulations, and managing budget impacts carefully.

Keywords: Budget; Human Resource; Organizational Culture; Regulation; Risk Management

INTRODUCTION

Risk management has now assumed a central position in both the private and public sectors, indicating a significant shift in strategic and operational decision-making approaches. In the private sector, risk management practices are crucial for minimizing potential financial losses and enhancing business sustainability. Meanwhile, in the public sector, effective risk management is essential for ensuring the efficient use of public resources and maintaining the reliability of services provided to the public. The integration of risk management across both sectors reflects a widespread recognition of its importance in achieving organizational objectives and maximizing value for stakeholders. Consequently, the effective implementation of risk management contributes to financial and operational stability and aids organizations in navigating the increasing complexity and uncertainty of today's global environment.

The National Medium-Term Development Plan (RPJMN) 2020–2024 in Indonesia mandates the implementation of risk management in public sector organizations. The government has explicitly identified the implementation of risk management in agency performance management as a key strategy for achieving good governance. Consequently, all agencies are required to incorporate risk management practices into their organizational management processes.

The Ministry of Public Works and Housing (Ministry of PUPR) is one of the ministries with the largest allocation of the State Budget (APBN). The effective implementation of risk management within the Ministry is crucial not only to ensure the successful execution of its infrastructure projects but also to prevent potential budgetary waste and misuse. Risk management serves as a tool that aids the Ministry in identifying, evaluating, and addressing risks that may obstruct the achievement of its strategic objectives (Fery, 2022). By integrating robust risk management practices into its governance system, the Ministry of PUPR can enhance transparency and accountability, thereby strengthening public trust. Moreover, these practices will ensure that every state-funded project delivers maximum benefits to the community (Graycar, 2019).

However, in practice, the implementation of risk management at the Ministry of PUPR has not been fully effective. Several instances of inadequate risk management have hindered the agency's performance targets, illustrating this ineffectiveness. For example, there have been cases where service providers have bribed officials at the East Kalimantan National Road Implementation Center with billions of rupiah (Akbar, 2023). Additionally, the Audit Board of the Republic of Indonesia (BPK RI) reported incomplete physical goods expenditure projects totaling IDR 43 billion, which were scheduled for completion in 2022 (Maharani & Alexander, 2023). These incidents suggest that the public sector often perceives the implementation of risk management as symbolic and merely formal. This perception views risk management as a burdensome administrative process rather than a necessary system to support performance (Susanto, 2020). Such views often stem from the belief that risk management procedures and policies increase workloads without providing tangible benefits.

Priyarsono and Munawar (2020) identified several factors contributing to inadequate risk management processes and ineffective practices. These include a lack of competent staff and insufficient human resource support within the organization, while also noted that inadequate budget allocation is a significant cause of ineffective risk management implementation. Togok (2016) and Zhao et al. (2013) found that three factors are key to the effectiveness of risk management implementation: board and senior management commitment (Salim, 2023), risk management processes, and goal setting. Additionally, Shimpi (2005) suggested that successful risk management implementation relies on the organization's ability to manage regulatory compliance.

This study aims to thoroughly examine the factors influencing the effectiveness of risk management implementation in Indonesian public sector organizations, particularly within the Ministry of PUPR. This research addresses the noticeable gap in empirical studies on factors affecting the effectiveness of risk management in the public sector. Most previous studies, as mentioned earlier, have focused on risk management effectiveness outside the Indonesian context. Only Priyarsono & Munawar (2020) and Sari et al. (2018) have conducted research within Indonesia. Priyarsono and Munawar (2020) explore the relationship between human resource factors and the effectiveness of organizational risk management, while Sari et al. (2018) investigate how organizational culture influences the achievement of organizational performance.

This study focuses on four key factors identified in academic literature as determinants of risk management effectiveness: human resources in risk management, availability and budget allocation for risk management activities, and regulations and policies related to risk management. Additionally, this study introduces a novel element by examining organizational culture as a factor influencing the effectiveness of risk management implementation. Previous research, including studies by Gunningham & Sinclair (2014), Ishtiaq et al. (2019), and Kimbrough & Componation (2009), highlight the significant impact of culture on risk management. While past research has explored factors such as human resources, budget, and internal regulations, this study delves deeper by investigating these factors within the specific context of Indonesian public sector organizations, particularly the Ministry of PUPR. Furthermore, it introduces organizational culture as a potential moderating variable in the effectiveness equation.

LITERATURE REVIEW

Risk Management

Risk is a negative event that can prevent or erode value, potentially hindering an organization from achieving its objectives. Therefore, it is crucial for organizations, including those in the public sector, to manage risks comprehensively and proactively. Effective risk management extends beyond merely identifying and mitigating risks; it also requires a deep understanding of the organization's risk culture and approach to managing uncertainties. This includes recognizing how risks are perceived by different stakeholders, how risk management processes are integrated into daily operations, and the degree of commitment from leadership to uphold these practices. Often overlooked, these elements are critical in shaping an organization’s resilience to unforeseen events (Darmansyah et al., 2024). By fostering a risk-aware culture and embedding risk management into the organizational framework, entities can better anticipate challenges, protect value, and enhance their ability to navigate complexities (Hopkin, 2018).

Human Resources

Human resources (HR) are valuable assets within an organization, encompassing all employees from top management to field workers. These individuals contribute their skills, knowledge, and abilities to achieve the organization's goals, reflecting not just labor but the quality and potential inherent in each person (Hermina & Yosepha in Sutanto et al., 2022). The presence of quality human resources is critical for active engagement in planning, implementing, and supervising all aspects of company management (Yusnandar, 2022). Their involvement is fundamental to ensuring the effectiveness of risk management implementation, as skilled and knowledgeable personnel are better positioned to identify potential risks, develop appropriate strategies, and monitor outcomes effectively. The expertise and skills of employees are significant in this context, with an emphasis on the necessity of investing in their development. By enhancing employees' knowledge and skills related to risk management, organizations can improve their risk mitigation strategies, thereby safeguarding against potential losses (Becker & Smidt, 2016).

Budget

A budget is a financial plan for a year, containing income and expenses estimates. It serves as a financial management tool for organizations to allocate resources to achieve specific goals. A well-designed budget allows organizations to identify, evaluate, and manage risks, enabling them to implement mitigations. Additionally, a sufficient budget allows for employee training on risk management, ensuring they have the necessary skills. Research by Kuntadi and Livrianti (2022) shows that budget availability is crucial for the effectiveness of risk management implementation. Adequate budgets allow organizations to allocate resources for risk management activities, such as training, software purchases, and professional consulting (Oktari et al., 2020).

Regulation and Policy

Regulations and policies are crucial to managing organizations and society. Regulations are established by authorities to govern behavior, protect public interests, and maintain balance across sectors like the environment, health, and safety (Baldwin et al., 2011). They can take the form of laws, rules, or guidelines. Policies, on the other hand, are principles or guidelines developed by organizations or governments to guide decision-making and actions. They are more flexible and can adapt to changes in situations or the organization's needs (Dye, 2021). The influence of regulations and policies on organizational effectiveness is significant. Clear and consistently applied regulations create a stable environment, preventing harmful behavior and maintaining high standards in product and service quality (Wu & Tham, 2023). However, excessive or inefficient regulations can increase administrative burden and reduce organizational flexibility.

Organizational Culture

The collective values, beliefs, attitudes, and behaviors of an organization's members shape its culture, reflecting the expectations of the workplace. The organization's history, traditions, and experiences influence its culture over time, shaping its internal environment and influencing individual and group operations. A strong organizational culture supports effective risk management implementation, while a weak one can create challenges. A culture that values learning, openness, integrity, and accountability can enhance risk management effectiveness (Kimbrough & Componation, 2009). Open discussions about risks, integrity, and accountability promote accurate risk identification and assessment, minimize unnecessary risk-taking, and ensure compliance with regulations. A culture that does not support risk management can create challenges in its implementation.

Hypotheses Development

The Effect of Human Resources on the Effectiveness of Risk Management Implementation

Risk management involves not only mitigating financial and operational risks but also managing human resources-related risks, such as employee retention, talent development, and employee engagement. Arulrajah (2016) shows that high-quality human resources practices can enhance corporate governance through participation, consensus orientation, accountability, transparency, responsiveness, effectiveness, efficiency, equality and inclusiveness, and compliance with laws and regulations. Thus, strategic and ethical human resources management can strengthen good governance practices, support business sustainability, and minimize human resources-related risks.

Kimbrough and Componation (2009) underscore the importance of viewing human resources as a critical element in the risk management framework. They suggest that organizations should place a strong emphasis on developing these resources to achieve risk management effectiveness. Kikwasi (2018) also investigated the critical success factors for effective risk management and found that human resources are a crucial component. A blend of employee skills, expertise, and experience is necessary for effective risk identification, analysis, and mitigation. Therefore, human resources play a significant role in the effectiveness of risk management within an organization. They are the cornerstone of a strong risk management strategy, embodying the collective competencies, knowledge, and attributes that individuals bring to the organization (Frigo & Anderson, 2011).

H1: Human resources have a positive effect on the effectiveness of risk management implementation.

The Effect of Budget on the Effectiveness of Risk Management Implementation
Adequate budgeting is one of the key factors in implementing effective risk management in an organization. A sufficient budget enables an organization to invest the necessary resources in identifying, evaluating, and managing risks effectively. With appropriate budget allocation, an organization can undertake training to enhance staff competence in risk management, develop systems and tools necessary for risk monitoring, and implement effective risk mitigation strategies (Hopkin, 2018).

Kikwasi (2018) emphasizes that budget availability is a crucial determinant of success in risk management. This study shows that the effectiveness of risk management often depends on an organization's ability to allocate sufficient budgetary resources to risk management practices. These resources include funding for routine training, acquiring up-to-date software, and conducting comprehensive risk assessments—all critical for building a strong risk management system. Without adequate budgetary provisions, an organization may struggle to obtain the necessary tools and technologies essential for a robust risk management system. These financial resources are vital not only for acquiring advanced analytical software and risk assessment tools but also for fostering a culture of continuous improvement through staff training and development.

H2: Budget availability has a positive effect on the effectiveness of risk management implementation.

The Effect of Regulations and Policies on the Effectiveness of Risk Management Implementation
Regulations and policies play a crucial role in the effectiveness of risk management implementation within an organization. Regulations set by governments and regulators provide a framework and standards that organizations should follow in managing risk. These regulations typically include guidelines on operational risk management, compliance, financial matters, and other related areas. With clear regulations, organizations have strong guidelines for identifying, measuring, and managing risks, thereby enhancing the effectiveness of risk management implementation (Hopkin, 2018).

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Additionally, internal organizational policies that support risk management are also crucial. Effective policies ensure that all employees understand their roles and responsibilities in risk management and provide consistent guidance throughout the organization. Strong policies help create a proactive risk culture where risk considerations are integrated into every business decision (Fraser et al., 2014).

Strong and effective regulations and policies positively impact the implementation of effective risk management within an organization, ultimately improving performance and achieving organizational goals more efficiently. Clear and structured policies help reduce uncertainty and improve coordination and collaboration between principals and agents, ensuring that both sides work towards common goals with effectively managed risks (Eisenhardt, 1989).

H3: Regulations and policies have a positive effect on the effectiveness of risk management implementation.

The Role of Organizational Culture in Moderating the Positive Effect of Human Resources on the Effectiveness of Risk Management Implementation

Research has shown that a strong organizational culture, which emphasizes organizational values, attitudes, and outcomes, mediates the relationship between human resources and various measures of program effectiveness in organizations, including risk management (Gregory et al., 2009). Additionally, a supportive organizational culture can enhance human resources performance and positively influence the implementation of risk management practices, suggesting a significant relationship between culture, HR management, and employee performance (Nyameh, 2013). This indicates that effective human resources management practices can improve the success of risk management in achieving project goals.

Gregory et al. (2009) conducted research suggesting that organizational culture, which shapes employee attitudes, can mediate the relationship between organizational values and organizational effectiveness, including in risk management. Nyameh (2013) also found that organizational culture moderates the relationship between human resource management practices and employee performance, which indirectly supports the effectiveness of risk management implementation. Additional studies bolster this perspective by demonstrating that an organizational culture fosters learning and growth, emphasizes results, promotes a positive work atmosphere, and exhibits a tolerance for risk and conflict.

An organizational culture that values feedback and learning from mistakes can strengthen the positive influence of human resources on risk management effectiveness (Drogalas et al., 2014). When employees feel safe to report mistakes and share learnings, organizations can improve existing processes and procedures and develop new, more effective approaches. A culture that supports continuous learning ensures that the organization continues to evolve and enhance its risk management capacity (Edmondson & Verdin, 2018).

H4: Organizational culture strengthens the positive influence of human resources on the effectiveness of risk management implementation.

The Role of Organizational Culture in Moderating the Positive Effect of Budget on the Effectiveness of Risk Management Implementation

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Budget availability has a significant influence on the effectiveness of risk management implementation in organizations, and organizational culture can moderate this relationship (Dong, 2001). An organizational culture that prioritizes proactive and responsible risk management can optimize the use of budget allocations to support risk management activities. A culture that emphasizes transparency and accountability will closely monitor the use of budgets for risk management, ensuring the effective and efficient allocation of funds to activities that genuinely enhance risk mitigation (Quinn, 2011).

An organizational culture that focuses on innovation and continuous improvement can also strengthen the positive influence of budgets on risk management effectiveness. In an environment that encourages innovation, organizations can use budgets to explore and implement new technologies and more effective risk management methods. For example, investments in information technology and analytics systems can enhance an organization's ability to detect, analyze, and respond to risks more quickly and accurately (Hillson, 2022).

An organizational culture that supports continuous learning and adaptation also impacts how budgets are used for risk management. In a dynamic environment, the ability to learn from experience and adapt risk management strategies is critical. A culture that promotes learning encourages organizations to use budgets for the continuous evaluation and development of new strategies. This ensures that risk management approaches remain relevant and effective amidst changing conditions and new threats (Edmondson & Verdin, 2018).

H5: Organizational culture moderates the positive influence of budget on the effectiveness of risk management implementation.

The Role of Organizational Culture in Moderating the Positive Effect of Regulations and Policies on the Effectiveness of Risk Management Implementation

A culture that is proactive in learning and innovation can also strengthen the positive influence of regulations and policies. In this context, organizations that value continuous learning and adaptation to change will be better able to integrate new policies and adapt to changing regulations. This culture ensures not only the mechanical application of policies but also their adjustment and updating in response to evolving conditions and challenges (Quinn, 2011).

A culture that prioritizes collaboration and employee engagement can enhance the effectiveness of regulation and policy implementation. Including employees from all levels in the risk management decision-making process increases their sense of ownership and commitment to the established policies and procedures. Employees will understand the rationale behind the rules and how they support the organization's goals, ensuring more effective implementation of policies and regulations (Edmondson & Verdin, 2018).

H6: Organizational culture strengthens the positive influence of internal regulations and policies on the effectiveness of risk management implementation.

RESEARCH METHOD

This research adopts a causal-explanatory approach with a quantitative methodology. It seeks to elucidate the cause-and-effect relationship between the independent variable and the dependent variable through hypothesis testing. The data employed in this study are primarily quantitative, collected directly from respondents via questionnaires. The questionnaires assess the influence of human resources practices, budgetary constraints, and regulatory frameworks on the efficacy of risk management implementation. The researchers also examine organizational culture as a potential moderator of these relationships (Singodimemdjo, 2014).

This research employs a survey methodology to gather primary data from the target population. The data collection instrument is a structured questionnaire—a set of written questions designed to elicit information from respondents. The Ministry of PUPR employees and civil servants (ASN) comprise the population for this study. The researchers chose the Ministry because of its significant budgetary allocation (APBN) and ongoing efforts to implement risk management practices.

This study employs judgmental sampling, a targeted approach that selects subjects with the most relevant knowledge and experience to provide the necessary information (Bougie & Sekaran, 2019). The researchers employed a specific sample criterion, focusing on employees within Echelon II Work Units at the Ministry of PUPR's Head Office who are actively involved in risk management implementation. Echelon II Work Units serve as policy centers, directly supporting the execution of various management programs, including risk management initiatives (Beroggi & Wallace, 2000).

This study adheres to the sample size recommendations outlined in the 'Rules of Thumb' concept (Roscoe, 1975), targeting a range between 30 and 500 participants. For multivariate studies, Bougie and Sekaran (2019) suggest a sample size exceeding ten times the number of variables. Considering this research employs six variables (one dependent, three independent, and two moderating), the ideal sample size would be at least 60. However, to ensure a sufficient response rate, the researchers opted to distribute questionnaires to 154 respondents, corresponding to two individuals from each of the 77 work units.

This study gathers information (primary data) directly from the existing population through a survey. The survey uses a questionnaire—a structured list of questions—to collect data from participants. To measure the variables, the study employs a Likert scale, a common tool where respondents rate their answers on a scale of 1 to 5.

This study uses component-based or variant-based structural equation modeling (SEM), known as partial least squares (PLS), with the help of the SmartPLS program. This technique was chosen because the PLS technique does not require many assumptions. In addition, SEM is a multivariate analysis technique that allows researchers to simultaneously model and estimate complex relationships among several dependent and independent variables (Sarstedt et al., 2021). PLS-SEM facilitates the easy specification of interactions to map moderation effects in the model. This makes PLS-SEM the method of choice in both simple and more complex moderation models (Sarstedt et al., 2021).

Operational Definition and Variable Measurement

Human Resources

Human resources are a crucial asset in an organization, encompassing individuals who contribute through their skills, knowledge, and abilities to achieve organizational goals.

This term includes all workers within an organization, from top management to field employees, and emphasizes not only the number of employees but also the quality and potential of each individual (Becker & Smidt, 2016). This study adopts variable indicators from Ayusdistira's (2022) research, which includes educational background, acquired training, task understanding, technology mastery, and primary health.

Budget

A budget is a financial plan created for a defined period, typically one year, detailing estimated revenues and expenditures. Budgets function as financial management tools that assist organizations or individuals in organizing their resources to achieve specific objectives. In an organizational context, budgets encompass planning, controlling, and evaluating financial activities to ensure efficient and effective operations (Oktari et al., 2020). This study utilizes variable indicators from Ajyad's (2022) research, including standard budget, budget targets, and budget benefits.

Regulation and Policy

Regulation and policy are crucial elements in managing and controlling organizations and society at large. They encompass rules established by authorities or supervisors to guide the behavior of individuals and organizations. The primary aims of regulation are to ensure compliance with certain standards, safeguard public interests, and maintain equilibrium across various sectors such as the environment, health, and security (Baldwin et al., 2011). This study adopts the following variable indicators from Rulyanti's (2016) research, they are the availability of regulations and policies, socialization, understanding, ease of implementation, and response to regulations and policies.

Organizational Culture

Over time, a distinct cultural identity develops within an organization, shaped by shared values, ingrained beliefs, and established behavioral norms. This cultural identity guides interactions and actions in the workplace, influenced by the organization's historical context, prevailing traditions, and the broader external environment (Schein, 2010). The variable indicators used in this study are derived from Hadianto's (2023) research and include mission, involvement, and adaptability.

RESULTS

Demographic Information of the Respondents

Table 1. Demographic Profiles

Characteristics	Frequency	Percentage (%)
Gender		
Male	60	45.5%
Female	72	54.5%
Educational Background		
Diploma’s degree	44	33.3%
Bachelor’s degree	70	53%
Master’s degree	18	13.7%
Institutions		
Secretariat General	18	13.6%
Inspectorate General	20	15.2%
Directorate General of Water Resources	26	19.7%
Directorate General of Highways	11	8.3%
Directorate General of Human Settlements	14	10.6%
Directorate General of Housing	10	7.6%

Directorate General of Construction Development	10	7.6%
Directorate General of Public Works and Housing Infrastructure Financing	7	5.3%
Regional Infrastructure Development Agency	6	4.5%
Human Resources Development Agency	10	7.6%

Data collection was conducted from June 10, 2024, to July 5, 2024. A total of 160 respondent data were collected. However, 3 outliers were identified and removed due to central tendency bias, resulting in a total of 132 usable data for further analysis. These outliers were excluded to prevent bias in the constructed relationships. Respondent information was collected through a questionnaire and is available in the demographic data section (see Table 1). The gender distribution of respondents was relatively balanced, with 60 male respondents (45.5%) and 72 female respondents (54.5%). The majority of respondents (70 or 53%) had a bachelor's degree (S1/D4). Respondents from the Directorate General of Water Resources represented the highest number with 26 respondents (19.7%), while the Regional Infrastructure Development Agency had the lowest number with 6 respondents (4.5%).

Outer Model Testing

Table 2. AVE

Variable	Indicator	AVE	Result
Effectiveness of Risk Management Implementation (ERM)	ERM1	0.514	Valid
	ERM2		Valid
	ERM3		Valid
	ERM4		Valid
	ERM5		Valid
	ERM6		Valid
	ERM7		Valid
	ERM8		Valid
	ERM9		Valid
	ERM10		Valid
	ERM11		Valid
	ERM12		Valid
	ERM13		Valid
	ERM14		Valid
	ERM15		Valid
	ERM16		Valid
	ERM17		Valid
	ERM18		Valid
	ERM19		Valid
Human Resources (HR)	HR1	0.511	Valid
	HR2		Valid
	HR3		Valid
	HR4		Valid
	HR5		Valid
	HR6		Valid
Budget (BUD)	BUD1	0.592	Valid
	BUD2		Valid
	BUD3		Valid
	BUD4		Valid
Regulation and Policy	RGP1	0.667	Valid

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Variable	Indicator	AVE	Result
(RGP)	RGP2		Valid
	RGP3		Valid
	RGP4		Valid
Organizational Culture (OGC)	OGC1	0.586	Valid
	OGC2		Valid
	OGC3		Valid
	OGC4		Valid
	OGC5		Valid
	OGC6		Valid
	OGC7		Valid

The effectiveness of the measures in capturing the intended concepts was verified by examining the average variance extracted (AVE). A minimum AVE of 0.5 signifies acceptable validity. The test results in Table 2 showed AVE values exceeding 0.5 for all variables, establishing convergent validity. To verify if the variables are distinct, the heterotrait-monotrait ratio of correlations (HTMT) was assessed. A good HTMT value is below 0.85. The results show that all variable pairs in the study have HTMT values below 0.85, confirming that the variables are separate concepts and strengthening their validity. To ensure the measures are consistent, their internal consistency was assessed using Cronbach's alpha and composite reliability. The results showed that all variables have internal consistency reliability test values above 0.7, indicating reliable data.

The validity and reliability analyses support the conclusion that the questionnaire adheres to the predefined criteria. Overall, the research instrument exhibits satisfactory levels of validity and reliability for subsequent data collection.

Hypotheses Testing

The bootstrapping results of the significance test are seen by comparing the p-value with the 5% significance limit and the t-value with the critical value of 1.65 (5% significance one-tailed test). Relevance is seen from the path coefficient value, with values close to 1 and 1 representing a negative relationship and a strong positive relationship, respectively. The verification of the proposed hypotheses is presented in Table 3.

Table 3. Path Coefficient Value

Variable	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics	P Values	Result
Human Resources → Risk Management Effectiveness	0.201	0.205	0.072	2.786	0.003	Accepted
Budget → Risk Management Effectiveness	0.245	0.244	0.083	2.955	0.002	Accepted
Regulation and Policy → Risk Management Effectiveness	0.333	0.333	0.079	4.203	0	Accepted

Human Resources * Organizational Culture → Risk Management Effectiveness	0.098	0.087	0.069	1.422	0.078	Rejected
Budget * Organizational Culture → Risk Management Effectiveness	-0.312	-0.324	0.087	3.585	0	Rejected
Regulation and Policy * Organizational Culture → Risk Management Effectiveness	0.165	0.166	0.094	1.763	0.039	Accepted

Table 3 provides insights into the relationships between various variables and the effectiveness of risk management implementation. Hypothesis 1 posits that human resources positively affect the effectiveness of risk management implementation, with a coefficient of 0.245. The study accepts this hypothesis, as the P-value of 0.004 is below the significance threshold of 0.05, indicating that changes in human resources significantly impact the effectiveness of risk management implementation. Similarly, Hypothesis 2 suggests that the budget positively influences the effectiveness of risk management implementation, also with a coefficient of 0.245. This hypothesis is accepted based on a P-value of 0.004, which is less than 0.05, suggesting that changes in the budget contribute to the effectiveness of risk management.

In Hypothesis 3, the regulation and policy variables are shown to have a positive effect on the effectiveness of risk management implementation, with a coefficient of 0.333. The study supports this hypothesis, as the P-value of 0.001 confirms that changes in regulations and policies significantly enhance risk management effectiveness. Moving to Hypothesis 4, the study examines whether organizational culture strengthens the positive influence of human resources on risk management implementation, with a reported coefficient of 0.098. However, the P-value of 0.303, which is greater than 0.05, leads to the rejection of this hypothesis, indicating that organizational culture does not significantly amplify the impact of human resources on risk management effectiveness.

Hypothesis 5 investigates whether organizational culture weakens the influence of the budget on the effectiveness of risk management implementation, with a negative coefficient of -0.215. The P-value of 0.053, which is slightly above the 0.05 threshold, results in the rejection of this hypothesis, suggesting that organizational culture does not significantly diminish the positive influence of the budget on risk management effectiveness. Finally, Hypothesis 6 explores the role of organizational culture in enhancing the influence of regulations and policies on risk management implementation, with a coefficient of -0.215. The study accepts this hypothesis, as the P-value of 0.03 is less than 0.05, indicating that organizational culture indeed strengthens the positive impact of regulations and policies on the effectiveness of risk management implementation.

DISCUSSION

Human Resources Positively Affect the Effectiveness of Risk Management Implementation

Hypothesis 1 posits that human resources positively affect the effectiveness of risk management implementation. Empirical testing in Table 3 confirmed this hypothesis, aligning with the findings of Dabbas and Alkshali (2020) research, who asserted that the skills and knowledge possessed by human resources significantly impact the effectiveness of risk management systems in organizations. Their research indicated that adequately trained employees enable organizations to better prepare for emerging risks and respond quickly and efficiently.

This study further supports the critical role of human resources in the effectiveness of risk management implementation. Competent employees possess the necessary skills and knowledge to identify potential risks and understand effective management strategies. Furthermore, employee involvement in the risk management process enhances accountability and transparency within the organization. When employees are actively involved in risk-related decision-making, they are more likely to participate and take responsibility for implementing risk mitigation strategies.

The empirical evidence from this study underscores that human resources are pivotal to the success of risk management in various organizations. The competence, skills, and knowledge of individuals involved in risk management significantly influence its effectiveness. Without trained and competent human resources, risk identification, assessment, and mitigation processes can be inadequate, undermining the overall success of risk management efforts.

Budget Positively Affects the Effectiveness of Risk Management Implementation

Hypothesis 2 posits that the budget positively influences the effectiveness of risk management implementation. The results of this study in Table 3 confirm this hypothesis, aligning with the findings of Fedchenko et al. (2022), who demonstrated that effective budget management enhances an organization's ability to assess and manage risks. A well-planned budget enables organizations to better identify potential risks and implement appropriate mitigation strategies.

Dian and Faturohman (2023) further support this view by showing that organizations incorporating risk maps into their budgeting process can more effectively identify and address risks early on. This integration allows for more informed and responsive budget decisions, which adapt to changes within the organizational environment.

Moreover, integrating risk management into the budgeting process can enhance accountability and transparency within organizations. Fedchenko et al. (2022) highlighted that budget management systems incorporating risk control elements help public sector entities minimize deviations from established standards and achieve their strategic goals.

This research affirms the significant role of budgeting in the effectiveness of risk management. By employing a well-structured budget, organizations can proactively identify and address potential risks, leading to more effective risk mitigation. Additionally,

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the integration of risk management into the budgeting process fosters greater accountability and transparency, enabling organizations to better align their financial management with strategic objectives and reduce deviations from set standards.

Regulations and Policies Positively Affect the Effectiveness of Risk Management Implementation

Hypothesis 3 posits that regulations and policies positively impact the effectiveness of risk management implementation. The test results presented in Table 3 validate this hypothesis. This finding is consistent with the studies by Abu-Rumman (2021) and Saad et al. (2024), which highlight that regulations and policies provide a structured framework for organizations to identify, assess, and manage risks effectively. According to Saad et al. (2024), companies adhering to robust risk management practices aligned with regulatory standards tend to experience improved financial performance. Additionally, Afifawati et al. (2023) found that regulations and policies promoting effective risk management contribute positively to value creation and overall organizational performance.

This research underscores the significant role of well-designed regulations and policies in enhancing risk management practices. Effective regulations create a structured framework, fostering transparency and accountability, which enhances organizational performance. A clear regulatory framework provides organizations with precise guidelines for managing risks, while increased transparency and accountability ensures that all stakeholders are responsible for their actions. Furthermore, regulations and policies that shape risk perception contribute to more informed and strategic decision-making, ultimately improving risk management effectiveness and organizational success.

Organizational Culture Does Not Strengthen the Positive Influence of Human Resources on the Effectiveness of Risk Management Implementation.

Hypothesis 4 posits that organizational culture enhances the positive influence of human resources on the effectiveness of risk management implementation. However, the results presented in Table 3 indicate that this hypothesis is not supported. The findings reveal that organizational culture does not appear to strengthen the impact of human resources on the effectiveness of risk management practices. Although there is limited research directly addressing this lack of a moderating effect, several studies provide insights into why organizational culture might not enhance the relationship between human resources and risk management effectiveness.

A key reason is that a non-adaptive organizational culture can obstruct progress in risk management implementation. Syahwani (2019) notes that an organizational culture misaligned with human resources strategies can undermine the implementation of these strategies, leading to inadequate support for risk management initiatives and reducing their effectiveness. Similarly, Moczydłowska et al. (2023) find that organizations with stable and risk-averse cultures often struggle with effective risk management, as such cultures may resist the innovation and adaptability required to address evolving external risks.

While organizational culture undoubtedly affects various aspects of operations, its influence on risk management effectiveness can be complex. Factors such as misalignment with strategic objectives, limited support for innovation, negative impacts on employee morale and commitment, and resistance to external changes can all hinder the positive contributions of culture. In this study, risk managers at the Ministry of PUPR have reported that the current organizational culture does not significantly affect how human resources are utilized in the risk management process, suggesting that other factors may play a more critical role in shaping risk management outcomes.

Organizational Culture Weakens the Positive Effect of Budget on the Effectiveness of Risk Management Implementation.

Hypothesis 5 posits that organizational culture enhances the positive impact of the budget on the effectiveness of risk management implementation. However, the results from testing this hypothesis, as shown in Table 3, indicate that Hypothesis 5 is rejected. The data reveals that rather than strengthening, organizational culture actually diminishes the influence of the budget on effective risk management implementation. Although prior research does not explicitly support the idea that organizational culture weakens the budget's impact on risk management, relevant studies can shed light on this phenomenon.

Research by Syahwani (2019) suggests that a strong, positive organizational culture can support the effective implementation of risk management strategies by ensuring adequate budget allocation and promoting transparency and accountability. Organizations with such cultures typically allocate sufficient resources for risk management, including investments in training, technology, and systems. Conversely, Croitoru (2016) highlights that a culture that undervalues risk management may lead to budget cuts for related programs, particularly in organizations focused on short-term profits rather than long-term sustainability. In these environments, risk management may be viewed as a cost rather than a strategic investment, leading to insufficient budget allocation.

This research aligns with the notion that a supportive organizational culture is crucial for maximizing the benefits of budgetary resources in risk management. However, if the organizational culture does not emphasize or support effective risk management, it can weaken the positive effects of budget allocation. In the context of this study, risk managers at the Ministry of PUPR reported that the current organizational culture does not support risk-based budgeting, which may explain the observed reduction in the budget's effectiveness for risk management.

Organizational Culture Strengthens the Positive Influence of Regulations and Policies on the Effectiveness of Risk Management Implementation

Hypothesis 6 posits that organizational culture strengthens the positive influence of regulations and policies on the effectiveness of risk management implementation. The results of hypothesis testing, as shown in Table 3, support this hypothesis. These findings align with the research of Alexander (2019) and Pathiranage et al. (2020), which highlights that regulations aimed at enhancing risk culture within organizations can significantly boost overall performance. They also emphasize the critical role of integrating a strong cultural framework to successfully implement risk management policies.

Organizational culture not only facilitates the execution of risk management but also ensures that regulations and policies are effectively internalized. Research by Sadeh et al. (2019) indicates that companies with a robust risk culture are more adept at reducing risks and improving compliance with regulatory standards. In this regard, organizational culture acts as a catalyst, promoting not just formal adherence to regulations but also their seamless integration into daily operations. Furthermore, Sadeh et al. (2019) find that a culture characterized by openness, accountability, and effective communication enhances awareness of and adherence to risk management practices. Organizations with such a culture are more successful in managing risk because their employees are more engaged and motivated to follow regulatory requirements.

Overall, organizational culture plays a pivotal role in amplifying the impact of regulations and policies on the effectiveness of risk management implementation. Cultures that support open communication and align with organizational structures can improve both responsiveness and efficacy in managing risks. Consequently, it is crucial for organizations to cultivate and sustain a culture that supports robust risk management practices.

CONCLUSION

This study identified several key factors impacting the effectiveness of risk management implementation at the Ministry of PUPR. Based on the research findings, it can be concluded that human resources, budget, and regulations and policies significantly influence the effectiveness of risk management implementation. Specifically, human resources and regulations and policies exhibit a strong positive effect, while the budget also plays a crucial role, albeit with varying impacts. The study also reveals that organizational culture does not always act as a moderating factor in enhancing the effectiveness of risk management implementation. While it strengthens the influence of regulations and policies, it does not significantly amplify the effect of human resources, and in some cases, it even weakens the positive impact of the budget.

Given these conclusions, it is recommended that organizations prioritize the development of human resources and the continuous improvement of regulations and policies to ensure effective risk management. Additionally, while organizational culture is essential, it should be carefully aligned with the overall risk management strategy to avoid potential negative interactions, particularly concerning budget management. Organizations should consider fostering an adaptive culture that supports and enhances the key drivers of risk management effectiveness.

This study contributes to the theoretical understanding of risk management effectiveness in the public sector, particularly within the Ministry of PUPR. It underscores the importance of human resources, budgeting, and regulatory frameworks in achieving effective risk management. However, the research is limited by its focus on Echelon II Work Units at the Head Office, which may not fully represent other work units. Future research could explore additional variables such as information technology, leadership, and ethical culture, and employ qualitative methods like in-depth interviews and case studies to gain deeper insights into staff perceptions and experiences with risk management implementation.

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DECLARATION OF CONFLICTING INTERESTS
In conducting this research, the authors have strived to maintain the highest standards of integrity and objectivity. Throughout the study, all procedures and analyses were carried out without any external influences that could compromise the validity or impartiality of the findings. After thorough consideration, the authors declared no

potential conflicts of interest, ensuring that the results presented are unbiased and solely based on the evidence gathered during the research process.

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