International Journal of Economics and Financial Issues

ISSN: 2146-4138

available at http: www.econjournals.com

International Journal of Economics and Financial Issues, 2026, 16(4), 86-93.

Assessing the Impact of Institutional Risk Management on Crop Productivity: Investigating the Moderating Influence of Human Resource Risk Management Practices

Dexter Senanu Kofi Hewlett[1]*, Kojo A Essel-Mensah[2], Evans Tee[3], Lawrence Asare Boadi[1], Vivian Esumanba Sampson[1]

[1]Department of Banking and Finance. University of Professional Studies, Accra, Ghana, [2]Department of Mathematical Statistics and Actuarial science, University of the Free State, South Africa, [3]Department of Economics and Actuarial Science. University of Professional Studies, Accra, Ghana. *Email: dhewlett@upsamail.edu.gh

Received: 11 February 2026 **Accepted:** 17 May 2026 **DOI:** https://doi.org/10.32479/ijefi.23708

ABSTRACT

This study examines the impact of institutional risk management (IRM) and human resource risk management (HRRM) on crop production (CP) in the agricultural sector. This study aimed to investigate the direct impacts of IRM and HRRM on CP, as well as to evaluate the moderating role of IRM in the HRRM-CP relationship. A quantitative research design was utilised, employing structural equation modelling (SEM) to analyse data from agricultural stakeholders. The findings indicate that both IRM and HRRM significantly positively influence CP, suggesting that enhancements in risk management practices can improve agricultural productivity. A 1% increase in HRRM results in a significant rise in CP, and IRM similarly exhibits a positive effect on crop production. When IRM was introduced as an interaction term, its moderating effect on the HRRM-CP relationship was statistically insignificant. This indicates that although both IRM and HRRM independently affect crop production, IRM does not significantly impact the strength of the HRRM-CP relationship. This study presents original findings indicating that HRRM and IRM are essential, yet distinct, factors affecting agricultural outcomes. The findings highlight the necessity for agricultural policymakers and stakeholders to prioritise HRRM and IRM within their risk management frameworks. This approach can promote increased crop yield and support sustainable agricultural advancement.

Keywords: Institutional Risk Management, Human Resource Risk Management, Crop Production, Risk Management, Agricultural Policy
JEL Classifications: A, J, Q

1. INTRODUCTION

Institutional risk management (IRM) is essential for improving agricultural resilience and crop productivity by addressing uncertainties associated with governance, infrastructure, and policy environments (Khakhula et al., 2023). Agriculture in Ghana is vulnerable to various risks, including market volatility and institutional inefficiencies, which affect smallholder farmers and the overall agricultural economy (Michalscheck et al., 2023; Lente et al., 2023). In the context of these challenges, human resource risk management (HRRM) serves as a vital moderating factor that enhances institutional frameworks by promoting efficient resource allocation, skill development, and adaptive leadership (Dandage et al., 2021). This study assesses the relationship between IRM and crop productivity, while examining the moderating influence of HRRM practices, thereby addressing a gap in agricultural risk literature that has frequently overlooked the human capital aspect.

The agricultural sector is fundamental to Ghana's economy, playing a crucial role in employment, food security, and GDP contribution. The sector's growth is impeded by ongoing institutional inefficiencies, such as insufficient policies, weak governance frameworks, and restricted resource access (Debrah, 2024; Amankwah et al., 2023). Institutional risk management frameworks seek to mitigate these challenges by enhancing resilience via policy reform, infrastructure investments, and the development of institutional capacities (World Bank, 2019). HRRM, defined by strategies aimed at reducing workforce-related risks including labour shortages, skill mismatches, and employee turnover, can enhance the effectiveness of institutional strategies (Manajemen et al., 2024). The integration of IRM and HRRM in influencing agricultural outcomes, despite their interdependence, remains insufficiently explored in current research.

Institutional inefficiencies and workforce vulnerabilities persistently hinder the productivity of Ghana's agricultural sector, notwithstanding the introduction of multiple risk management frameworks. Current research has largely concentrated on market and production risks, overlooking the complex interplay between institutional mechanisms and human resource capacities (Raji et al., 2024; Khatri et al., 2024; Shah et al., 2021). This oversight results in a significant knowledge gap concerning the ways in which HRRM practices can improve the effectiveness of IRM in enhancing crop productivity. Addressing this gap is crucial for formulating comprehensive risk management strategies that align institutional objectives with workforce dynamics.

This study aims to evaluate the impact of institutional risk management on crop productivity and to examine the moderating role of human resource risk management practices. This study aims to address the following research question: (i) What is the effect of institutional risk management on crop productivity in Ghana? (ii) In what ways do human resource risk management practices affect crop productivity? (iii) To what extent do human resource risk management practices influence the relationship between institutional risk management and crop productivity?

Previous studies (Prentzas et al., 2024; Zanin et al., 2024; Federico and Martinelli Lasheras, 2023; Ivanov and Atanasov, 2023) have thoroughly investigated risk management strategies in agriculture, primarily focussing on market and production risks, while the influence of institutional factors remains inadequately addressed. Moreover, previous research has seldom incorporated HRRM as a moderating variable, neglecting its capacity to alleviate institutional challenges and enhance agricultural outcomes (Ivanov and Atanasov, 2023). This study examines the intersection of integrated risk management (IRM) and human resource risk management (HRRM) in relation to crop productivity, thereby contributing to the existing literature on agricultural risk management.

This study adds to the discourse on agricultural resilience by presenting empirical evidence regarding the significant role of HRRM in improving the effects of IRM on crop productivity. The findings will provide actionable insights for policymakers, agricultural institutions, and development organisations by identifying synergies between institutional frameworks and workforce strategies. The study addresses a notable gap in the literature by presenting HRRM as a moderating factor, thereby enhancing both theoretical and practical insights into risk management in agriculture.

2. LITERATURE REVIEW

Institutional risk management (IRM) encompasses organised frameworks, strategies, and policies aimed at mitigating systemic uncertainties in agricultural institutions (Khakhula et al., 2023). Van Wassenhove et al. (2022) define IRM as a mechanism that includes governance structures, policy interventions, and resource allocations designed to mitigate inefficiencies and improve resilience to external shocks. IRM is essential for stabilising agricultural productivity, especially in developing economies like Ghana, where inadequate institutions frequently obstruct sustainable development initiatives. Crop productivity, defined as the yield of crops per unit area, is a critical measure of agricultural efficiency and is affected by various institutional, environmental, and labor-related factors (Siddique et al., 2024).

Human resource risk management (HRRM) is a systematic method for identifying, assessing, and mitigating risks associated with the workforce, including labour shortages, skill mismatches, employee turnover, and insufficient capacity building (Phaladi et al., 2024). Qorri et al. (2024) emphasise the importance of HRRM in equipping agricultural institutions with a resilient workforce to tackle emerging challenges. The incorporation of HRRM into institutional frameworks is essential for enhancing the efficacy of IRM practices, as workforce readiness plays a crucial role in the execution of policies and strategies designed to improve agricultural outcomes. This study investigates the moderating effect of HRRM on the relationship between IRM and crop productivity.

This research utilises the resource-based view (RBV) theory alongside systems theory to establish a solid theoretical framework. The RBV theory, as presented by Chatterjee et al. (2024), asserts that an organization's success is contingent upon the effective use of distinctive resources, such as institutional frameworks and human capital. This theory posits that IRM and HRRM function as strategic resources, potentially providing competitive advantages in enhancing crop productivity. The resource-based view emphasises the significance of institutional capacity and workforce readiness as essential factors for enhancing agricultural resilience and sustainability (Ferreira and Ferreira, 2023). Critics, including Mehmood et al. (2023), contend that the resource-based view (RBV) disproportionately focusses on internal factors, neglecting external influences like market dynamics and environmental risks. Orlu and Rambe (2022) assert that the integration of resource-based approaches into agricultural strategies enhances resilience, especially when workforce dynamics are properly addressed.

Systems theory conceptualises organisations as interconnected entities, wherein the performance of one subsystem directly impacts the overall system efficacy (Becvar et al., 2023). This theory highlights the interdependence of institutional policies and workforce practices, stressing the necessity for integrated strategies to effectively manage agricultural risks (Harris, 2024).

This study uses systems theory to examine the moderating effect of HRRM on crop productivity, in relation to IRM and highlights the two-way interaction between institutional arrangements and human capital potential. Systems theory provides a comprehensive framework for understanding complex interactions, but it often lacks clear operational guidance on how to address sector-specific challenges, which is why complementary theoretical perspectives are often necessary (Arnold & Wade, 2015). Researchers such as Blumler (2024) advocate for systems-based approaches in agriculture, highlighting that integrated frameworks produce superior outcomes compared to isolated interventions.

Empirical studies offer additional insights into the relationships among the variables being examined. Ayamba et al. (2023) investigated the influence of institutional governance on crop productivity in Ghana through regression analysis, revealing a positive correlation between effective IRM practices and productivity improvements. The study highlighted the significance of coherent policies and efficient resource allocation in reducing institutional risks. Ivanov and Atanasov (2023) examined the impact of HRRM on agricultural productivity using structural equation modelling, finding that workforce training and capacity-building initiatives significantly improve organisational performance. Prentzas et al. (2024) examined the moderating effect of HRRM on the relationship between institutional frameworks and sectoral productivity, utilising hierarchical regression analysis. The findings indicate that HRRM significantly enhances the effectiveness of institutional policies, especially in tackling labor-related issues.

Despite these contributions, literature gaps persist concerning the integrated effects of IRM and HRRM on crop productivity. Previous studies (Prentzas et al., 2024; Zanin et al., 2024; Federico and Martinelli Lasheras, 2023; Ivanov and Atanasov, 2023) have primarily examined market and production risks, with insufficient focus on the interdependence of institutional and workforce dimensions. The interaction between macro- and micro-level risk management practices remains underexplored, indicating a need for further empirical investigation. This study investigates the role of HRRM in moderating the relationship between IRM and crop productivity, providing insights into the integration of risk management practices within the agricultural sector.

This study critically applies resource-based view (RBV) and systems theory to understand and address challenges in agricultural risk management. The resource-based view highlights the significance of institutional and workforce resources in enhancing agricultural productivity, whereas systems theory offers a comprehensive framework for examining the dynamic interactions between institutional resource management and human resource management. Theoretical perspectives facilitate a thorough analysis of the study variables, enhancing the understanding of agricultural risk management in Ghana.

3. METHODOLOGY

This research utilises a quantitative design, employing survey methodology to systematically gather and analyse data regarding the relationship between institutional risk management (IRM) and crop productivity, while considering the moderating effect of human resource risk management (HRRM). Quantitative research is appropriate for this study because it enables the analysis of relationships between variables through statistical methods, thereby ensuring objectivity and replicability (Hirose and Creswell, 2023). The study will utilise a structured questionnaire to collect primary data, focussing on demographic information and responses pertinent to the study variables. The questionnaire comprises two sections. The initial section will examine demographic information, encompassing respondents' age, educational attainment, years of experience in agriculture or related institutions, and the scale of their farming operations. The second section will utilise a five-point Likert scale, with responses ranging from 1 (strongly disagree) to 5 (strongly agree), to assess the study variables.

The variables for IRM will be derived from indicators identified by Federico and Martinelli Lasheras (2023) and Ivanov and Atanasov (2023), with an emphasis on policy coherence, resource allocation efficiency, and governance structures. HRRM measures were adapted from Qorri et al. (2024) and include employee capacity-building, workforce stability and risk mitigation practices relevant to agricultural production systems. Crop productivity will be evaluated according to output per unit area and associated efficiency metrics, as outlined by the FAO (2019).

The data will undergo analysis through descriptive and inferential statistical methods. Descriptive statistics will summarise the demographic characteristics of respondents, whereas inferential analysis will examine the relationships among the variables. Structural equation modelling (SEM) will be utilised to examine the proposed relationships, due to its capacity to analyse intricate interactions among variables, including moderating effects (Hair et al., 2014). Statistical analyses will utilise SPSS version 26 for descriptive statistics and SmartPLS version 4 for hypothesis testing. This methodological approach guarantees the rigour and validity of the study, yielding significant insights into the relationship between IRM, HRRM, and crop productivity in Ghana.

4. PRESENTATION OF THE RESULTS

4.1. Descriptive Analysis

Table 1 provides a descriptive statistical analysis of the respondents' demographic characteristics, including age, gender, educational level, and farming experience. This analysis offers a fundamental understanding of the sample's composition and highlights the diversity present within the respondent population. The analysis rigorously explored demographic factors to discern patterns that could affect respondents' views and practices concerning risk management and crop productivity. Demographic variables are crucial for contextualising the study's findings, as variations in age, educational attainment, or experience may affect individuals' perceptions and the adoption of risk management strategies. Understanding this heterogeneity is crucial for analysing differences in the effectiveness and implementation of these strategies across various agricultural contexts.

Table 1: Descriptive statistical analysis result -demographic

Construct	Frequency	Percentage
Gender		
Male	556	52.8
Female	498	47.2
Age group		
Under 20	81	7.7
21-30	264	25
31-40	125	11.9
41-50	243	23.1
51-60	219	20.8
Above 60	122	11.6
Educational level		
Primary education	270	25.6
Secondary school education	195	18.5
Tertiary education	370	35.1
No formal education	219	20.8
Year of experience		
<5 years	268	25.4
5-10 years	245	23.2
11-20 years	268	25.4
Over 20 years	273	25.9

Source: Authors own creation

The study sample consisted of 52.8% male and 47.2% female participants, providing a balanced representation that improves the generalisability of findings and supports gender-specific analysis of agricultural practices and risk-management strategies. This diversity facilitates a comprehensive understanding of gender roles, decision-making processes, and resource access within farming communities.

The age distribution indicated that the largest proportion (25%) of participants belonged to the 21-30 age group, underscoring the significance of young farmers and their capacity for innovation and technology adoption. The age groups 41-50 (23.1%) and 51-60 (20.8%) highlight the significance of experienced farmers, who provide valuable expertise yet face challenges in adopting modern practices. The low representation of individuals under 20, at 7.7%, indicates a necessity for targeted interventions to engage youth in agriculture.

Educational attainment exhibited variability, with 20.8% of individuals lacking formal education, 35.1% completing secondary education, and 18.5% achieving tertiary education. The prevalence of secondary education indicates a moderate literacy level among farmers, affecting their ability to implement risk-management strategies. Farmers with tertiary education are more equipped to foster innovation, while those with restricted formal education may need customised capacity-building programs.

The farming experience among participants varied, with 25.9% possessing over 20 years of experience, indicating a substantial knowledge base within the sample. In contrast, 25.4% possessed fewer than 5 years of experience, indicating potential for the incorporation of contemporary techniques. The 5-10 (23.2%) and 11-20 (25.4%) year experience groups demonstrated a combination of traditional and contemporary practices, establishing them as significant contributors to innovation diffusion and knowledge transfer.

Table 2: Construct reliability, validity, and multicollinearity

Construct and items	Factor Loading	Cronbach Alpha	Composite Reliability	AVE	VIF
CP1	0.718	0.812	0.869	0.571	1.436
CP2	0.773				1.623
CP3	0.752				1.610
CP4	0.774				1.728
CP5	0.760				1.604
HRRM1	0.745	0.857	0.891	0.538	1.699
HRRM2	0.720				1.634
HRRM3	0.733				1.647
HRRM4	0.721				1.615
HRRM5	0.715				1.714
HRRM6	0.757				1.854
HRRM7	0.743				1.839
IRM1	0.742	0.809	0.862	0.513	1.574
IRM2	0.658				1.503
IRM3	0.745				1.676
IRM4	0.751				1.668
IRM5	0.616				1.464
IRM6	0.769				1.837

Source: Authors own creation

4.2. Measurement Model

The research utilised confirmatory factor analysis (CFA) to assess the reliability and validity of measurement scales, thereby confirming the structural integrity of latent constructs (Kyriazos, 2018). This analysis was crucial for confirming the consistency and accuracy of the constructs and their related indicators. Key assessment metrics comprised Cronbach's alpha (CA), composite reliability (CR), and factor loadings, which collectively functioned as essential indicators of internal consistency and construct validity within the measurement model.

Reliability was assessed through Cronbach's alpha, with all constructs surpassing the recommended threshold of 0.7, indicating strong internal consistency. The composite reliability (CR) values exceeded the 0.7 threshold, indicating that the observed indicators effectively represented significant variance of their respective constructs while reducing measurement error. Convergent validity was evaluated through average variance extracted (AVE), with all values surpassing the 0.5 minimum threshold proposed by Bagozzi and Yi (2012). This indicates that the latent constructs explained a substantial portion of the variance in their corresponding observed variables.

The CFA results presented in Table 2 indicated that all factor loadings exceeded 0.6, demonstrating strong item-construct relationships and confirming the robustness of the measurement model. The findings confirm the internal consistency, convergent validity, and overall reliability of the constructs, thereby validating the model's suitability for hypothesis testing and empirical analysis. The methodological rigour used to evaluate measurement reliability and validity increases the credibility of the study's findings and bolsters its theoretical and empirical contributions (Hair et al., 2019).

Cronbach's alpha is a statistical coefficient used to assess the internal consistency of measurement items within a construct, ensuring their reliability in capturing the intended latent variable. As shown in Table 2, all constructs exhibited Cronbach's alpha (CA) values surpassing the recommended threshold of 0.70, confirming strong internal consistency. This indicates that the measurement items within each construct were highly correlated and effectively captured the underlying theoretical concept. Additionally, the composite reliability (CR) values demonstrated significant improvement, reinforcing the robustness of internal consistency across constructs. These findings affirm that the constructs appropriately accounted for the shared variance of their respective indicators, thereby enhancing the reliability and coherence of the measurement model.

Average variance extracted (AVE) was utilized to evaluate convergent validity within the confirmatory factor analysis (CFA) framework. AVE quantifies the proportion of variance in observed variables that is attributable to their underlying latent construct, relative to total variance (including measurement error). Consistent with established benchmarks, all AVE values exceeded the 0.50 threshold, as recommended in the literature, confirming that the indicators sufficiently explained a substantial portion of variance within their respective constructs. This result underscores the constructs' validity in representing their intended theoretical dimensions.

Discriminant validity was assessed using the Fornell-Larcker criterion, which compares the square root of AVE for each construct against its correlations with other constructs (Fornell and Larcker, 1981). Establishing discriminant validity is crucial to ensuring that each construct is theoretically distinct and empirically independent (Ramayah et al., 2018). As presented in Table 3, the square root of AVE for each construct consistently exceeded its highest correlation with any other construct, confirming the absence of significant overlap among constructs. This indicates that the constructs captured unique aspects of the research model, preserving the structural integrity and theoretical distinctiveness of the measurement framework. These findings validate the robustness of the measurement model, establishing a strong foundation for subsequent hypothesis testing and structural equation modeling.

The Fornell-Larcker Criterion is a commonly employed statistical approach in structural equation modelling (SEM) for assessing discriminant validity, ensuring that constructs within a model are adequately distinct from each other. The analysis of discriminant validity in this study produced satisfactory results, confirming that the constructs were sufficiently differentiated. The differentiation is crucial for establishing the credibility of the constructs in subsequent analyses, ensuring that each construct captures a unique and relevant dimension of the data. This distinction improves the reliability and robustness of the research framework, thereby strengthening the validity of the model's theoretical foundations and its relevance to the study's objectives.

The Heterotrait-Monotrait (HTMT) ratio was utilised to evaluate discriminant validity. The HTMT ratio is considered a more sensitive and rigorous method for assessing the empirical distinctiveness of constructs than traditional approaches (Henseler et al., 2015). The research examined multiple thresholds for HTMT values. Kline (2011) proposed a conservative threshold of 0.85 or below, while Teo et al. (2008) suggested a more lenient threshold of 0.90 or below. The results in Table 4 indicate that the HTMT ratios for all constructs were significantly below the 0.90 threshold, thus satisfying the criteria for adequate discriminant validity. This demonstrates that the constructs are theoretically and empirically distinct, thereby reinforcing the validity of the measurement model. The study establishes a robust foundation for reliable hypothesis testing and the interpretation of causal relationships within the structural model by adhering to rigorous standards.

The next phase entailed assessing the degree to which the independent variables accounted for the variance in the dependent variable. This study's measurement model was designed to evaluate how well the independent variables explained the observed variability in the dependent variable.

Table 5 presents R^2 values that offer important insights into the explanatory power of the independent variables in the model. The R^2 value of 0.510 for crop production (CP) signifies that 51% of the variance in CP is accounted for by institutional risk management (IRM) and human resource risk management (HRRM). This indicates a robust predictive ability, implying that changes in CP are notably affected by these risk management practices.

Figure 1 provides a pictorial graph and an overview of measurement model analysis of the relationships between various latent constructs and their indicators. The factor loadings of the observed variables for all constructs in institutional risk management (IRM), human resource risk management (HRRM),

Table 3: Discriminant validity Fornell-Larker criteria

Construct	CP	HRRM	IRM
CP	0.756		
HRRM	0.646	0.734	
IRM	0.662	0.679	0.716

Source: Authors own creation

Table 4: Discriminant validity-HTMT

Construct	CP	HRRM	IRM
CP			
HRRM	0.772		
IRM	0.812	0.808	

Source: Authors own creation

Table 5: Model Fit-R^2

Construct/dependent variable	R^2	R^2 adjusted
CP	0.510	0.509

Source: Authors own creation

Table 6: Structure assessment model

Path relationship	Beta coefficient	Standard deviation	T statistics	P-values
HRRM->CP	0.368	0.034	10.834	0.000
IRM->CP	0.431	0.034	12.769	0.000
HRRM×IRM->CP	0.043	0.024	1.785	0.074

Source: Authors own creation

Figure 1: Measurement model analysis

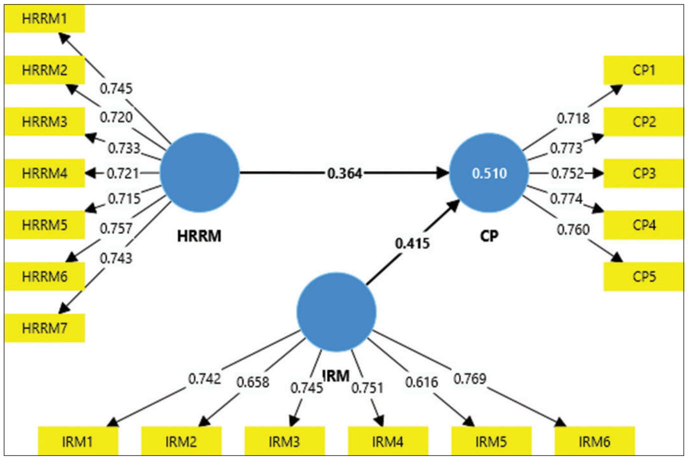
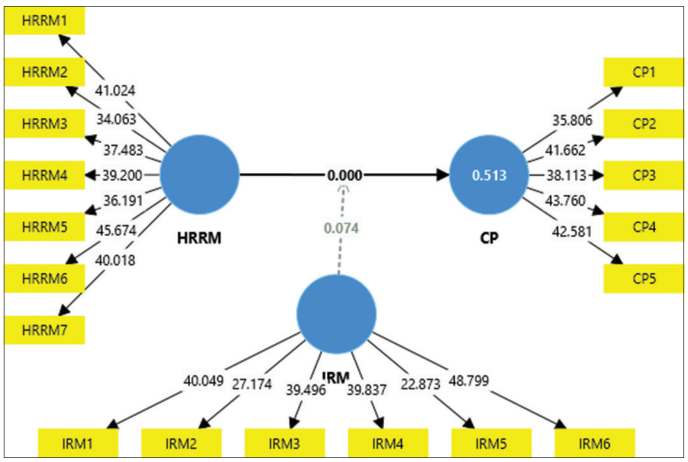


Figure 2: Structure assessment model



and crop production (CP) confirm the reliability and validity of the measurement model applied in this study.

Table 6 displays the findings from the structural model assessment, emphasising the direct relationships between the independent variables and crop production (CP). The analysis indicates that human resource risk management (HRRM) positively and significantly influences CP, evidenced by a standardised path coefficient (β) of 0.368, a t-value of 10.834, and a P-value below 0.000. This suggests that a 1% increase in HRRM correlates with a 36.8% increase in CP. This finding highlights the important role of HRRM in improving crop production, indicating that enhanced human resource management practices significantly influence agricultural productivity.

Institutional risk management (IRM) exhibits a positive and statistically significant impact on CP, indicated by a path coefficient (β) of 0.431, a t-value of 12.769, and a $P < 0.000$. This finding indicates that a 1% increase in institutional risk management correlates with a 43.1% increase in agricultural outcomes, underscoring the significance of effective risk management practices.

When IRM was introduced as an interactive variable to assess its moderating role in the relationship between HRRM and CP, the results indicated a positive yet statistically insignificant effect (β = 0.043, t = 1.785, P = 0.074). This indicates that IRM does not influence the relationship between HRRM and CP, suggesting that both IRM and HRRM directly affect crop production, but IRM does not enhance or modify the impact of HRRM on CP. This finding is significant for elucidating the specific roles of these risk management practices in affecting crop production.

The pictorial graph of the structural assessment model shown in Figure 2 proposes the hypothesized relationships for institutional risk management (IRM), human resource risk management (HRRM), and crop production (CP). The figure depicts the direct impact of IRM and HRRM on CP, as well as the interaction effect utilized in testing the moderating role of IRM in the HRRM–CP relationship.

5. DISCUSSION

This study provides insights into the influence of risk management strategies on crop production (CP). Both human resource risk management (HRRM) and institutional risk management (IRM) significantly positively influence crop production, underscoring the importance of risk management practices in agriculture for enhancing productivity. This finding is consistent with prior research highlighting the significance of human and institutional resources in reducing risks within agricultural contexts. Research by Binswanger et al. (2015) demonstrates the beneficial effects of HRRM on farm productivity, indicating that enhanced human resource practices contribute to more efficient risk management and, as a result, increased productivity. Studies by FAO (2016) indicate that institutional risk management plays a crucial role in promoting agricultural growth, with effective policies and frameworks significantly enhancing production outcomes.

This study's examination of the moderating role of IRM in the HRRM-CP relationship yields a notable finding. The absence of statistical significance in the interaction term between IRM and HRRM challenges prior research indicating that institutional frameworks may strengthen the influence of human resource management on agricultural productivity. A study by Akinola et al. (2018) demonstrated that institutional interventions enhanced the connection between resource management practices and agricultural output. This study's results indicate that both HRRM and IRM independently influence CP; however, IRM does not enhance the effect of HRRM on crop production, suggesting a weaker interaction between these variables than previously assumed.

6. CONCLUSION

This study's findings enhance the discourse on agricultural risk management by confirming the important roles of HRRM and IRM in improving crop production. Both HRRM and IRM demonstrate a significant independent effect on agricultural outcomes; however, the expected moderating role of IRM in the HRRM-CP relationship is not corroborated by the data. This suggests that although both types of risk management are important, their interaction may not be as significant as previously assumed. The findings indicate significant implications for policymakers and practitioners, emphasising the necessity of separately enhancing human resources and institutional frameworks to boost agricultural productivity. Subsequent studies should investigate other variables that could mediate or moderate the relationship between risk management practices and crop production.

6.1. Theoretical Implications

This study provides important theoretical insights by analysing the connections among human resource risk management (HRRM), institutional risk management (IRM), and crop production (CP) in the context of agricultural risk management theories. The findings support the significance of the resource-based view (RBV), indicating that human and institutional resources are essential for improving productivity (Barney, 1991). HRRM's positive influence on CP reinforces the notion that human capital constitutes a valuable, rare, and inimitable resource that enhances agricultural outcomes (Grant, 1991). Moreover, the independent positive effect of IRM is consistent with institutional theory, which emphasises the importance of formal institutions in enhancing economic performance (North, 1990).

Nonetheless, the absence of a notable moderating effect of IRM on the HRRM-CP relationship contradicts Contingency Theory, which asserts that external factors, including institutional frameworks, should enhance organisational outcomes (Fiedler, 1964). This discrepancy indicates that further contextual variables might affect the relationship between HRRM and IRM in agricultural contexts.

6.2. Policy and Practical Implications

The findings of the study highlight the necessity for policies that emphasise both HRRM and IRM to enhance agricultural productivity. This indicates that governments and institutions ought to invest in human capital and reinforce institutional frameworks to reduce risks and improve crop production. Policymakers should take into account context-specific factors to ensure effective implementation.

REFERENCES

Akinola, A.O., Adedeji, A.T., Olayemi, J.O. (2018), The moderating effect of institutional frameworks on the relationship between risk management practices and agricultural productivity. Journal of Agricultural Economics, 39(4), 550-563.

Amankwah, E., Awafo, E., Nunoo, E., Abu, A. (2023), Planting for food and jobs in post-COVID era: Identifying the missing gaps for sustainable food production–a review. Journal of the Ghana Institution of Engineering, 23(4), 26-34.

Arnold, R.D., Wade, J.P. (2015), A definition of systems thinking: A systems approach. Procedia Computer Science, 44, 669-678.

Ayamba, B.E., Buri, M.M., Sekyi-Annan, E., Devkota, K., Dossou-Yovo, E.R., Ulzen, O.O., Biney, N. (2023), Increasing lowland rice yields of smallholder farmers through the adoption of good agricultural practices in the forest agro-ecological zone of Ghana. Plant Production Science, 26(4), 335-349.

Bagozzi, R.P., Yi, Y. (2012), Specification, evaluation, and interpretation of structural equation models. Journal of the Academy of Marketing Science, 40(1), 8-34.

Barney, J. (1991), Firm resources and sustained competitive advantage. Journal of Management, 17(1), 99-120.

Becvar, R.J., Becvar, D.S., Reif, L.V. (2023), Systems Theory and Family Therapy: A Primer. Maryland: Rowman & Littlefield.

Binswanger, H.P., Deininger, K., Feder, G. (2015), Agricultural risk management in developing countries: Theory and evidence. World Bank Research Observer, 30(1), 1-27.

Blumler, M.A. (2024), Ecology, evolutionary theory and agricultural origins. In: The Origins and Spread of Agriculture and Pastoralism in Eurasia. London: Routledge. p.25-50.

Chatterjee, S., Chaudhuri, R., Vrontis, D., Thrassou, A. (2023), Revisiting the resource-based view (RBV) theory: From cross-functional capabilities perspective in post COVID-19 period. Journal of Strategic Marketing, 2023, 1-16.

Dandage, R.V., Rane, S.B., Mantha, S.S. (2021), Modelling human resource dimension of international project risk management. Journal of Global Operations and Strategic Sourcing, 14(2), 261-290.

Debrah, B. (2024), Quantitative measurement of agricultural support in Ghana using PSE (producer support estimate) indicator. International Journal of Research and Innovation in Social Science, 8(1), 1426-1443.

Federico, G., Martinelli Lasheras, P. (2023), Risk Management in Traditional Agriculture: Intercropping in Italian Wine Production (No. 233). EHES Working Paper.

Ferreira, N.C., Ferreira, J.J. (2024), The field of resource-based view research: Mapping Past, present and future trends. Management Decision, 63(4), 1124-1153.

Fiedler, F.E. (1964), A contingency model of leadership effectiveness. Psychological Bulletin, 62(2), 293-308.

Food and Agriculture Organization (FAO). (2016), Institutional Frameworks for Agricultural Risk Management: An Overview. FAO, Rome. Available from: https://www.fao.org/3/a-i5763e.pdf

Food and Agriculture Organization (FAO). (2019), Guidelines for the Measurement of Productivity and Efficiency in Agriculture. Available from: https://openknowledge.fao.org/server/api/core/bitstreams/82099501-b5b0-4bd6-8d78-d08083652a55/content

Fornell, C., Larcker, D.F. (1981), Evaluating structural equation models with unobservable variables and measurement error. Journal of Marketing Research, 18(1), 39-50.

Grant, R. M. (1991). The resource-based theory of competitive advantage: Implications for strategy formulation. California Management Review, 33(3), 114-135.

Hair, J.F., Hult, G.T.M., Ringle, C.M., Sarstedt, M. (2019), A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM). London: SAGE Publications.

Hair, J.F., Jr., Sarstedt, M., Hopkins, L., Kuppelwieser, V.G. (2014), Partial least squares structural equation modeling (PLS-SEM): An emerging tool in business research. European Business Review, 26(2), 106-121.

Harris, D.R. (2024), Introduction: Themes and concepts in the study of early agriculture. In: The Origins and Spread of Agriculture and Pastoralism in Eurasia. London: Routledge. p.1-9.

Henseler, J., Ringle, C.M., Sarstedt, M. (2015), A new criterion for assessing discriminant validity in variance-based structural equation modeling. Journal of the Academy of Marketing Science, 43(1), 115-135.

Hirose, M., Creswell, J.W. (2023), Applying core quality criteria of mixed methods research to an empirical study. Journal of Mixed Methods Research, 17(1), 12-28.

Ivanov, R., Atanasov, D. (2023), Risk management in agriculture. Agricultural Sciences, 15, 37-45.

Khakhula, B., Kostyuk, O., Lanchenko, O., Antonyuk, H., Homon, O. (2023), Innovative tools for risk management of the production activities of agricultural enterprises in an institutional environment.

Scientific Horizons, 27, 136-153.

Khatri, P., Kumar, P., Shakya, K.S., Kirlas, M.C., Tiwari, K.K. (2024), Understanding the intertwined nature of rising multiple risks in modern agriculture and food system. Environment, Development and Sustainability, 26(9), 24107-24150.

Kline, R.B. (2011), Principles and Practice of Structural Equation Modeling. 3rd ed. New York: The Guilford Press.

Kyriazos, T.A. (2018), Applied psychometrics: Sample size and sample power considerations in factor analysis (EFA, CFA). Psychology, 9(8), 2207-2230.

Lente, I., Heve, W.K., Owusu-Twum, M.Y., Gordon, C., Opoku, P., Nukpezah, D., Klutse, N.A. (2023), Nature of climate change-induced risks in semi-arid northwestern Ghana: Gauged observations, perceptions of smallholder farmers, and perspectives for livelihood adaptation. Information Development, 41, 02666669231185323.

Manajemen, S., Di, R., Keuangan, L., Asmi, Y., Banjarmasin, C., Kunci, K., Keuangan, I., Risiko, I. (2024), Risk Management Strategies in Financial Institutions. Management Studies and Business Journal (Productivity), 1, 154-163.

Mehmood, K., Zia, A., Alkatheeri, H.B., Jabeen, F., Zhang, H. (2023), Resource-based view theory perspective of information technology capabilities on organizational performance in hospitality firms: A time-lagged investigation. Journal of Hospitality and Tourism Technology, 14(5), 701-716.

Michalscheck, M., Kizito, F., Kotu, B.H., Avornyo, F.K., Timler, C., Groot, J.C. (2023), Preparing for, coping with and bouncing back after shocks. A nuanced resilience assessment for smallholder farms and farmers in Northern Ghana. International Journal of Agricultural Sustainability, 21(1), 2241283.

North, D.C. (1990), Institutions, Institutional Change and Economic Performance. Cambridge: Cambridge University Press.

Orlu, K.N., Rambe, P. (2022), The significance of market power in the financial sustainability of emerging agricultural cooperatives in the central free state of South Africa: A Resource-based View. Southern African Business Review, 26, 21.

Phaladi, M.P., Omarsaib, M., Mhlongo, P.M., Mpungose, B. (2024), Integrating strategic human resource management practices for effective knowledge risk management in public enterprises: A systematic review and future research directions. In: Trends, Challenges, and Practices in Contemporary Strategic Management. United States: IGI Global. p.213-235.

Prentzas, A., Bournaris, T., Nastis, S., Moulogianni, C., Vlontzos, G. (2024), Enhancing sustainability through weather derivative option contracts: A risk management tool in Greek agriculture. Sustainability, 16(17), 7372.

Qorri, D., Pergéné Szabó, E., Felföldi, J., Kovács, K. (2024), The role of human resource management in agricultural labor-saving technologies: An integrative review and science mapping. Agriculture, 14(7), 1144.

Raji, E., Ijomah, T.I., Eyieyien, O.G. (2024), Integrating technology, market strategies, and strategic management in agricultural economics for enhanced productivity. International Journal of Management and Entrepreneurship Research, 6(7), 2112-2124.

Ramayah, T., Cheah, J., Chuah, F., Ting, H., Memon, M.A. (2018), Partial Least Squares Structural Equation Modeling (PLS-SEM) using SmartPLS 3.0: An Updated Guide and Practical Approach. Pearson.

Shah, K.K., Modi, B., Pandey, H.P., Subedi, A., Aryal, G., Pandey, M., Shrestha, J. (2021), Diversified crop rotation: An approach for sustainable agriculture production. Advances in Agriculture, 2021(1), 8924087.

Siddique, K.H., Bolan, N., Rehman, A., Farooq, M. (2024), Enhancing crop productivity for recarbonizing soil. Soil and Tillage Research, 235, 105863.

Teo, T.S., Wei, K.K., Benbasat, I. (2008), Predicting intention to adopt interorganizational linkages: An institutional perspective. MIS Quarterly, 32(1), 19-49.

Van Wassenhove, W., Foussard, C., Denis-Remis, C. (2022), A case study on the Industrial Risk Management (IRM) post-master academic education program of MINES Paris PSL University. Safety science, 151, 105733.

World Bank. (2019), Building Resilience: Integrating Climate and Disaster Risk into Development. Washington, DC: World Bank. Available from: https://www.worldbank.org/ext/en/home

Zanin, G.M., Muwafu, S.P., Costa, M.M. (2024), Nature-based solutions for coastal risk management in the Mediterranean basin: A literature review. Journal of Environmental Management, 356, 120667.