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among Agro-Food Processing SMEs in Western Uganda**

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Abstract

Purpose: Human capital has become one of the most important intangible assets that help to improve competitiveness and financial results in small and medium-sized businesses (SMEs). But there is little empirical evidence on its role in agro-food processing SMEs in Uganda. The effect of human capital on financial performance of agro-food processing SMEs in western Uganda was investigated.

Methodology: The study used a quantitative cross-sectional survey design guided by the resource-based view and the knowledge-based view of the firm which involved the owner-managers and senior managers of the registered agro-food processing SMEs in Mbarara, Lyantonde, Sheema, Bushenyi, Ntungamo and Rukungiri districts. The data was gathered through the use of a structured questionnaire, and analysed through Partial Least Squares Structural Equation Modelling (PLS-SEM) in SmartPLS 4. The analysis was carried out in two steps: measurement model and structural model. The measurement model was tested using indicator reliability, internal consistency reliability, convergent validity, and discriminant validity, and

subsequently the structural model was tested using a bootstrapping with 5000 resampling for hypothesis testing with the model fit indices including the Comparative Fit Index (CFI), Root Mean Square Error of Approximation (RMSEA), std root mean square residual (SRMR) and Goodness of Fit Index (GFI).

Findings: The results showed good reliability, validity and overall model fit. The results of structural model estimation showed that the human capital positively and significantly influenced the financial performance of agro food processing SMEs ($\beta = 0.508$, $t\text{-value} = 7.482$, $p\text{-value} < .001$).

Recommendations: The study concludes that investment in human capital is a strategic method to take SMEs' financial performance to a more favorable level and suggests ongoing employee development and capacity building programs to boost enterprise competitiveness and sustainability.

Keywords: *Human Capital, Financial Performance, Agro-Food Processing Smes, Intellectual Capital, PLS-SEM, Western Uganda*

INTRODUCTION

Small and Medium Enterprises (SMEs) are well known as a key contributor to the global economy, job creation, innovation and poverty alleviation. Small and medium enterprises (SMEs) make up a large share of the industrial base in developing economies and are key to value addition and industrial development, especially within the agro-food processing sector, which has a significant impact on agricultural productivity, food security, and rural livelihoods (World Bank, 2023). Agro-food processing SMEs play a pivotal role in Uganda in making cashable products from agro-products, employment generation and the industrialisation policy of the country. However, due to their importance, these businesses face productivity, competitiveness and financial performance problems to varying degrees (Ahaibwe et al., 2022).

In the past, firm performance has been linked to physical resources, including physical infrastructure, technology and financial capital. But the advent of the knowledge-based economy has redirected focus on intangible resources as important factors in organizational success. One of these resources, intellectual capital, has become increasingly recognised as a strategic resource that can lead to sustainable competitive advantage and improved business performance (Xu & Li, 2022). Intellectual capital refers to the knowledge-based resources that are part of the individuals, organizational systems and relationships that help create value and help the organization grow. Human capital is considered the most important resource of an organization, as it represents the knowledge, skills, competencies, experiences and innovative capacity of the organization's members (Youndt et al., 2004).

The Resource Based View (RBV) and the Knowledge Based View (KBV) of the firm both reinforces the importance of human capital. The RBV theory suggests that an organization's performance will be better when it has valuable, rare, inimitable and non-substitutable resources (Barney, 1991). Human capital meets these conditions: Employee knowledge and expertise is hard to copy. Likewise, the KBV sees knowledge as the most strategically important organizational asset, where employees are the ones responsible for organising, disseminating and using knowledge, to benefit the organization (Grant, 1996). Therefore, companies that invest in employee development, training and capability enhancement are likely to have a better financial performance.

Generally, empirical evidence indicates that human capital is positively related to firm performance. Previous research has demonstrated that employee competencies, knowledge and skills lead to enhanced productivity, innovation, profitability, and business growth (Asiaei et al., 2023; Kianto et al., 2022). But results are inconclusive, especially in SMEs in developing economies. Some studies show that a positive correlation exists between human capital and organizational performance (e.g., Xu & Wang, 2024), while others indicate that the relationship between human capital and organizational performance is weak or even insignificant, implying that contextual factors shape the effectiveness of human capital investments. In addition, most of the available research has been carried out in large organizations and financial institutions, and little attention has been paid to agro-food processing SMEs in Sub-Saharan Africa.

The research into intellectual capital is still relatively underdeveloped in Uganda, particularly in the agro-food processing sub-sector. Previous research has mainly focused on the broader performance problems of SMEs without defining the nature of human capital's impact on various financial outcomes including sales growth, profit growth, and financial efficiency. This context gap is responsible for the lack of knowledge regarding how knowledge-based resources improve the performance of enterprises in emerging economies.

In methodological terms, many earlier studies have been based on traditional regression methods that might not be suitable to the latent nature of human capital and business performance constructs. Structural Equation Modeling (SEM) is a stronger analysis that

examines both the reliability of the measures and the structure at the same time, taking into account measurement errors (Hair et al., 2022). Therefore, SEM is considered to be appropriate to analyze the effect of human resource on the financial performance.

In this context, this study examines the relationship between human capital and financial performance of agro-food processing SMEs in Western Uganda. There are three aspects of financial performance: sales growth, profit growth, and financial efficiency. Through the use of SEM, the study has made a contribution to the literature on intellectual capital by providing evidence from an under-researched context and insights for SME managers and policy makers interested in improving the competitiveness of enterprises by focusing on strategic investments in human capital.

Literature Review and Hypothesis Development

Theoretical Foundation

This study is anchored in the Resource-Based View (RBV) and the Knowledge-Based View (KBV) of the firm to model the effect of Human capital on Financial Performance. The RBV posits that organizations achieve sustained competitive advantage through valuable, rare, inimitable, and non-substitutable resources. Human capital represents such a strategic resource because employees' knowledge, skills, and experience are difficult for competitors to replicate and can significantly enhance organizational performance (Barney, 1991). The KBV extends this argument by emphasizing knowledge as the most strategically important organizational resource capable of generating value and superior performance through innovation, learning, and effective decision-making (Grant, 1996).

In the context of SMEs, human capital enables firms to identify opportunities, improve operational efficiency, adapt to changing market conditions, and develop innovative solutions that enhance financial outcomes. Consequently, enterprises possessing knowledgeable, skilled, and experienced employees are expected to demonstrate superior financial performance compared to their counterparts with weaker human capital resources.

Based on the concepts of the Resource-Based View and the Knowledge-Based View, human capital is an important internal resource which translates into financial indicators such as growth in sales and profits, and financial efficiency, not directly, but through the performance of important modelling activities like innovation and quality management.

Human Capital and Financial Performance

Human capital is widely recognized as a critical dimension of intellectual capital and refers to the collective knowledge, skills, competencies, experience, and capabilities possessed by employees that contribute to organizational value creation (Youndt et al., 2004). Recent literature suggests that human capital is particularly important for SMEs because it enhances organizational adaptability, innovation capability, and strategic decision-making, all of which contribute to improved financial performance. Studies have consistently shown that firms with stronger human capital resources tend to experience higher profitability, sales growth, and operational efficiency (Hariyono & Narsa, 2024).

For this study, human capital is conceptualized through three dimensions: knowledge, employee skills, and experience. These dimensions represent the core competencies that enable employees to create value and support organizational performance.

Knowledge and Financial Performance

Knowledge refers to the information, understanding, expertise, and professional competence possessed by employees that enable them to perform tasks effectively and make informed decisions. Knowledge has become increasingly important in knowledge-based economies

where organizational success depends on the ability to acquire, create, and utilize information effectively. Employees with superior knowledge can identify market opportunities, improve product quality, enhance customer satisfaction, and optimize business processes.

Recent studies indicate that knowledge significantly contributes to SME performance by facilitating innovation, problem-solving, and strategic responsiveness. A systematic review by Yadewani et al. (2024) concluded that employee knowledge is among the most important determinants of SME performance because it improves organizational learning and decision-making capabilities. Similarly, studies on intellectual capital and SME performance have found that knowledge assets positively influence financial outcomes through enhanced productivity and competitiveness.

However, despite growing evidence from developed and emerging economies, limited empirical research has examined the effect of employee knowledge on the financial performance of agro-food processing SMEs in Uganda. Most existing studies focus on manufacturing firms and large corporations, creating a contextual gap in SME literature.

Employee Skills and Financial Performance

skills refer to the technical, managerial, and operational abilities that enable employees to execute tasks efficiently and effectively. Skills determine the quality of work performed, the efficiency of resource utilization, and the ability of employees to adapt to changing organizational demands.

Research indicates that skilled employees contribute significantly to organizational performance through improved productivity, innovation, and operational excellence. Yadewani et al. (2024) found that employee skills are positively associated with SME performance because they enhance the firm's capacity to implement business strategies and respond to market challenges. Similarly, studies investigating human capital dimensions have demonstrated that employee skills positively influence firm performance through improved knowledge management and organizational effectiveness.

In agro-food processing SMEs, employee skills are particularly important because production processes often require specialized technical competencies related to product quality, food safety standards, processing technologies, and market requirements. Nevertheless, empirical evidence regarding the influence of employee skills on financial performance in agro-food processing SMEs remains limited, especially in developing economies such as Uganda.

Experience and Financial Performance

Experience refers to the accumulated knowledge, expertise, and practical understanding acquired through years of work and exposure to different business situations. Experienced employees possess tacit knowledge that enables them to solve problems efficiently, reduce operational errors, and make informed strategic decisions.

The literature suggests that experience is a valuable component of human capital because it enhances organizational learning and operational efficiency. Dar and Mishra (2021) identified experience as one of the key dimensions of human capital within SMEs and argued that experienced employees contribute significantly to business growth and competitiveness. Similarly, studies examining human capital dimensions report that work experience positively influences firm performance by improving decision quality, innovation capability, and resource management.

Although previous studies have established the importance of employee experience, evidence from agro-food processing SMEs remains scarce. Most studies have focused on broader SME

populations without examining sector-specific contexts where experience may play a critical role in determining financial outcomes.

In essence, a synthesis of these empirical perspectives reveals that the relationship between knowledge, skills, and experience exists as mutually reinforcing and interdependent components of a more advanced latent construct referred to as Human Capital. Specifically, cognitive knowledge serves as the theoretical framework, skills as the tool for implementation, and experience as the source of the implicit understanding required to ensure efficiency and innovation.

Research Gap

A considerable amount of empirical research on the impact of human capital on business organizations has been done so far; yet there are several crucial gaps that need further consideration. The first gap is contextual since the majority of empirical researches on intellectual capital were carried out in developed countries and emerging Asian economies. There is little empirical evidence for Sub-Saharan African countries, especially Uganda, where studies focused on human capital of agro-food processing small- and medium-size enterprises are scarce (Demartini & Beretta, 2020). The second one is conceptual as the majority of researches treat human capital as a monolithic entity without analyzing its separate components, such as knowledge, skills and experience (Dar & Mishra, 2021). Third, a serious deficiency from a methodological point of view arises since linear regression methods traditionally assume that both human capital and financial performance are observed variables without any measurement error; in this case, however, SEM makes it possible to solve these problems by separating the measurement error of variables under study via Confirmatory Factor Analysis and estimating the complicated structural connections between latent variables at the same time (Le et al., 2024); The present research attempts to close these gaps together by studying the impact of human capital (knowledge, employees' skills, experience) on the financial performance (sales growth, profit growth, financial efficiency) of the agro-food processing SMEs operating in Western Uganda by means of SEM.

Hypothesis Development

The Resource-Based View and Knowledge-Based View suggest that human capital constitutes a strategic organizational resource capable of enhancing firm performance. Employees who possess superior knowledge, skills, and experience are better positioned to improve productivity, innovation, operational efficiency, and profitability. Empirical evidence similarly indicates that human capital positively influences SME performance across different contexts (Hariyono & Narsa, 2024).

Accordingly, the following hypothesis is proposed:

H1: Human capital has a positive and significant effect on financial performance among agro-food processing SMEs in Western Uganda.

Conceptual Framework



Figure 1. Proposed Structural Model of Human Capital and Financial Performance among Agro-Food Processing SMEs in Western Uganda

Source: Authors' conceptualization based on the Resource-Based View (Barney, 1991), Knowledge-Based View (Grant, 1996), and empirical studies on human capital and firm performance (Kianto et al., 2022; Asiaei et al., 2023; Xu & Wang, 2024).

The conceptual framework suggested that Human Capital which is manifested as Knowledge, skills and experience has a positive relationship with the Financial Performance of agro-food processing SMEs in Western Uganda. Human capital is a critical intangible asset that can boost employees' creative thinking in resolving organizational issues, increase productivity, and adapt to market conditions, leading to better business performance (Kianto et al., 2022; Asiaei et al., 2023). Based on the literature, financial performance is perceived as a second-order construct associated with indicators such as sales and profit growth, as well as financial efficiency, which are considered success and sustainability indicators of SMEs (Liu et al., 2022; Hariyono & Narsa, 2024). Numerous empirical studies have shown that companies with well-trained, knowledgeable, and experienced workers tend to be more profitable, have higher sales figures, and more efficient at using resources, as this enhances decision-making, innovation, and the use of resources (Asiaei et al., 2023; Xu & Wang, 2024). In line with this, the framework proposes that human capital positively and significantly influences the financial performance of agro-food processing SMEs.

Materials and Methods

Research Design

This study adopted a quantitative cross-sectional survey design to examine the effect of human capital on the financial performance of agro-food processing SMEs in Western Uganda. A quantitative approach was considered appropriate because it facilitates the collection of standardized data from a large number of respondents and enables the empirical testing of hypothesized relationships among latent constructs using Structural Equation Modeling (SEM) (Hair et al., 2022). The cross-sectional design was selected because data were collected at a single point in time, allowing the study to capture the prevailing perceptions of SME owners and managers regarding human capital and financial performance.

Study Area and Population

The study was conducted among agro-food processing SMEs located in selected districts of Western Uganda, namely Mbarara, Lyantonde, Sheema, Bushenyi, Ntungamo, and Rukungiri. Western Uganda was selected because it hosts a vibrant SME sector that contributes significantly to regional economic development, employment creation, value addition, and household income generation. The selected districts are characterized by diverse agro-food processing activities, including grain milling, dairy processing, fruit processing, bakery production, beverage manufacturing, and other agricultural value-addition enterprises. These enterprises play a critical role in enhancing agricultural productivity and promoting industrial

development within the region. The target population comprised registered agro-food processing SMEs operating within the selected districts. The unit of analysis was the SME, while the unit of inquiry was the owner-manager or senior manager due to their extensive knowledge of the firm's human capital resources and financial performance.

Sample Size and Sampling Procedure

The sample size was determined using the minimum sample size requirements for Structural Equation Modeling. Following Hair et al. (2022), a sample exceeding 200 respondents is generally considered adequate for estimating complex structural models and ensuring sufficient statistical power. A multi-stage sampling approach was employed. First, districts with a high concentration of agro-food processing SMEs were purposively selected. Thereafter, SMEs were selected using simple random sampling from lists obtained from relevant local government and business registration authorities. Within each enterprise, owner-managers or senior managers were selected as key informants.

Measurement of Variables

Human capital was operationalized as a higher-order construct comprising three dimensions: knowledge, employee skills, and experience. Knowledge was measured through indicators assessing employees' understanding of business operations, industry expertise, and problem-solving capabilities. Employee skills were measured through technical, managerial, and operational competencies, while experience was assessed through employees' accumulated work-related expertise and practical understanding of business processes. The measurement items were adapted from validated intellectual capital scales used in previous studies (Asiaei et al., 2023; Xu & Wang, 2024).

Financial performance was conceptualized as a higher-order construct reflected by sales growth, profit growth, and financial efficiency. Respondents evaluated their firm's performance relative to competitors over the previous three years. Subjective performance measures were adopted because they are appropriate for SMEs where objective financial records are often unavailable or inaccessible and have been found to correlate strongly with objective performance indicators (Hariyono & Narsa, 2024).

All measurement items were assessed using a five-point Likert scale ranging from 1 = Strongly Disagree to 5 = Strongly Agree.

Data Collection Procedure

Primary data were collected using a structured questionnaire administered to owner-managers and senior managers of agro-food processing SMEs. Prior to the main survey, the questionnaire was subjected to expert review and pilot testing to assess clarity, relevance, and content validity. Necessary modifications were made based on feedback received. Data collection was conducted through direct visits to the selected enterprises with the assistance of trained research assistants.

Data Analysis

Data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) with SmartPLS 4 software. PLS-SEM was preferred because it is suitable for prediction-oriented research, accommodates complex hierarchical constructs, and performs effectively with non-normal data and relatively moderate sample sizes (Hair et al., 2022).

The analysis followed a two-step procedure involving assessment of the measurement model and structural model. The measurement model was evaluated using indicator reliability, internal consistency reliability, convergent validity, and discriminant validity. Indicator reliability was assessed through outer loadings, with values above 0.70 considered acceptable.

Internal consistency reliability was evaluated using Cronbach's alpha and Composite Reliability (CR), with threshold values exceeding 0.70. Convergent validity was assessed using Average Variance Extracted (AVE), where values above 0.50 indicated adequate convergent validity. Discriminant validity was evaluated using the Heterotrait-Monotrait Ratio (HTMT), with values below 0.85 considered satisfactory (Hair et al., 2022).

The structural model was assessed using path coefficients (β), coefficient of determination (R^2), effect size (f^2), predictive relevance (Q^2), and bootstrapping procedures involving 5,000 subsamples to test the significance of the hypothesized relationships. The hypothesis was supported when the path coefficient was positive and statistically significant at $p < .05$.

Ethical Considerations

Ethical approval was obtained from the relevant institutional authorities before data collection. Participation was voluntary, and informed consent was obtained from all respondents. Confidentiality and anonymity were maintained throughout the study, and the collected data were used exclusively for academic purposes.

Results

Introduction

This section presents the empirical findings of the study. The analysis was conducted using SmartPLS 4 following the recommended two-stage approach for Partial Least Squares Structural Equation Modelling (PLS-SEM) (Hair et al., 2022). The analysis began with preliminary data screening and descriptive statistics, followed by exploratory factor analysis to establish the underlying factor structure of the measurement scales. Thereafter, the measurement model was evaluated through reliability and validity assessments before estimating the structural model to test the hypothesized relationship between human capital and financial performance among agro-food processing SMEs in Western Uganda.

Descriptive Statistics

Descriptive statistics were computed to summarize respondents' perceptions regarding the study variables. Table 1 presents the mean scores and standard deviations for all observed indicators measuring human capital and financial performance.

Table 1: Descriptive Statistics of Measurement Items

	Mean	Std. Deviation
HCK1	3.693	1.259
HCK2	3.626	1.386
HCK3	3.575	1.293
HKS1	3.682	1.304
HKS2	3.413	1.335
HKS3	4.385	0.816
HCE1	3.939	1.050
HCE2	3.458	1.329
HCE3	3.950	1.077
BPSG1	3.391	1.256
BPSG2	3.229	1.344
BPSG3	3.911	1.128
BPPG1	3.469	1.282
BPPG2	3.855	1.162
BPPG3	3.419	1.284

Table 1: Descriptive Statistics of Measurement Items

	Mean	Std. Deviation
BPFE1	3.374	1.465
BPFE2	3.592	1.270
BPFE3	3.352	1.287

Thus, overall, the mean values provide an indication of respondents' level of agreement with the measurement items, while the standard deviations reflect the degree of variability in responses. Generally, higher mean scores suggest that respondents perceived their enterprises to possess relatively strong human capital capabilities and satisfactory financial performance. The relatively moderate standard deviations indicate reasonable consistency in respondents' opinions across the sampled SMEs.

Exploratory Factor Analysis (EFA)

Prior to estimating the PLS-SEM model, Exploratory Factor Analysis (EFA) was conducted to examine the underlying dimensionality of the measurement scales (human capital and financial performance) and to ensure that the observed variables loaded appropriately onto their respective latent constructs. The suitability of the data for factor analysis was first assessed using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett's Test of Sphericity.

The KMO value exceeded the recommended threshold of 0.70, indicating adequate sampling adequacy for factor analysis, while Bartlett's Test of Sphericity was statistically significant ($p < 0.001$), confirming that sufficient correlations existed among the variables to justify factor extraction Tables 2a & 2b, and Tables 5a & 5b.

Tables 3 & 6, Principal Component Analysis with Varimax rotation was employed to extract the factors. Items with factor loadings below the recommended threshold of 0.50 or exhibiting substantial cross-loadings were removed from subsequent analyses. The retained items loaded strongly on their respective constructs, confirming the multidimensional structure of human capital and financial performance.

Tables 4 & 7, extracted factors explained a substantial proportion of the total variance, exceeding the minimum recommended level of 60%, thereby providing evidence that the measurement scales possessed satisfactory construct validity.

Table 2a: Kaiser-Meyer-Olkin Test for Human Capital

	MSA
Overall MSA	0.844
HKS1	0.813
HKS2	0.853
HKS3	0.832
HCK1	0.798
HCK2	0.816
HCK3	0.920
HCE1	0.862
HCE2	0.863
HCE3	0.854

Table 2b: Bartlett's Test for HC

χ^2	df	p
627.666	36.000	< .001

Table 3: Factor Loadings

Factor 1	Uniqueness
HCK2	0.743
HKS1	0.715
HKS2	0.698
HCK3	0.697
HCK1	0.662
HCE2	0.660
HCE3	0.640
HCE1	0.515
HKS3	0.406
	0.448
	0.489
	0.513
	0.515
	0.562
	0.565
	0.591
	0.734
	0.835

Note. Applied rotation method is varimax.

Table 4: Factor Characteristics

Eigenvalues		Rotated solution	
		SumSq. Loadings	Proportion var. Cumulative
Factor 1	4.302	3.749	0.617 0.617

Table 5a: Kaiser-Meyer-Olkin Test Financial Performance

	MSA
Overall MSA	0.871
BPSG1	0.827
BPSG2	0.867
BPSG3	0.903
BPPG1	0.850
BPPG2	0.910
BPPG3	0.914
BPFE1	0.848
BPFE2	0.841
BPFE3	0.888

Table 5b: Bartlett's Test for FP

χ^2	df	p
486.695	36.000	< .001

Table 6: Factor Loadings

	Factor 1	Uniqueness
BPPG2	0.682	0.535
BPPG1	0.682	0.535
BPSG1	0.662	0.562

Table 5b: Bartlett's Test for FP

	X²	df	p
BPSG3		0.640	0.590
BPPG3		0.587	0.655
BPSG2		0.584	0.659
BPFE1		0.557	0.689
BPFE2		0.544	0.704
BPFE3		0.538	0.711

Note. Applied rotation method is varimax.

Table 7: Factor Characteristics

	Eigenvalues	Rotated solution		
		SumSq. loadings	Proportion var.	Cumulative
Factor 1	3.976	3.360	0.673	0.673

Measurement Model Assessment

The measurement models were evaluated by examining indicator reliability, internal consistency reliability, convergent validity, and discriminant validity of human capital and financial performance constructs.

Indicator Reliability

Indicator reliability was assessed using outer loadings. Following Hair et al. (2022), indicator loadings of 0.70 or higher were considered satisfactory, although indicators with loadings between 0.40 and 0.70 were retained where they contributed to overall construct reliability and content validity. The results indicate that all retained indicators exhibited satisfactory outer loadings, demonstrating that each observed variable adequately represented its respective latent construct Figures 2 & 3.

Internal Consistency Reliability

Internal consistency reliability was evaluated using Cronbach's Alpha and Composite Reliability (CR). As shown in Table 8, all constructs exceeded the recommended threshold value of 0.70 for both reliability coefficients, indicating satisfactory internal consistency. These findings demonstrate that the measurement scales consistently captured the underlying constructs of human capital and financial performance.

Convergent Validity

Convergent validity was assessed using the Average Variance Extracted (AVE). The results indicate that all constructs recorded AVE values above the recommended threshold of 0.50, suggesting that the constructs explained more than half of the variance of their respective indicators. Consequently, convergent validity of the measurement models was established, Table 8

Table 8: Internal Consistence, Convergent Validity (AVE) & Composite reliability

Construct	Cronbach's Alpha	AVE	CR
Human Capital	0.863	0.532	0.867
Financial Performance (FP)	0.839	0.565	0.841

Model plot

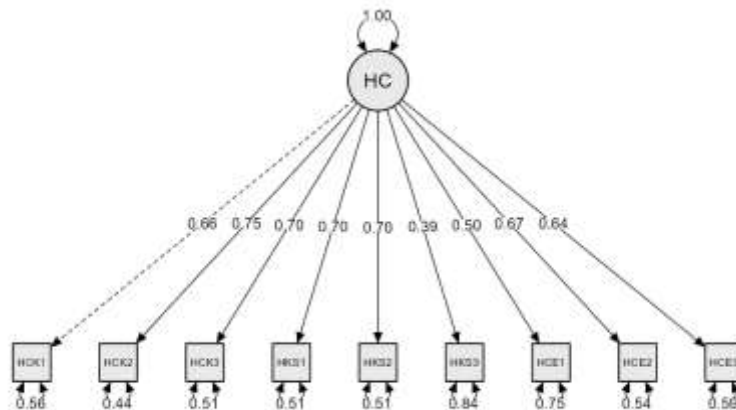


Figure 2: Single Factor Measurement Model for Human Capital

Figure 2, the measurement model exhibited excellent goodness-of-fit. The Comparative Fit Index (CFI = 0.950) met the recommended threshold of 0.95, indicating an excellent fit between the hypothesized model and the observed data. The Root Mean Square Error of Approximation (RMSEA = 0.037) indicated an exceptionally close model fit, while the Standardized Root Mean Square Residual (SRMR = 0.063) remained below the recommended cut-off value of 0.08. Additionally, the Goodness-of-Fit Index (GFI = 0.986) exceeded the recommended threshold of 0.90, further confirming the adequacy of the measurement model. Collectively, these indices demonstrate that the model provides an excellent representation of the observed data and is appropriate for further reliability, validity, and structural model assessment.

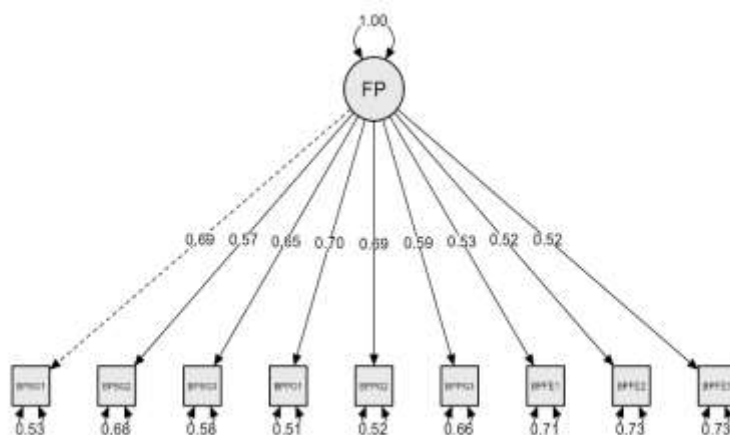


Figure 3: Single Factor Measurement Model for Financial Performance

Figure 3, the measurement model exhibited satisfactory goodness-of-fit. The Comparative Fit Index (CFI = 0.903) exceeded the recommended threshold of 0.90, while the Root Mean Square Error of Approximation (RMSEA = 0.059) and the Standardized Root Mean Square Residual (SRMR = 0.059) were both below the recommended maximum value of 0.08. In addition, the Goodness-of-Fit Index (GFI = 0.981) indicated excellent model fit. Collectively, these fit indices demonstrate that the hypothesized measurement model adequately fits the observed data and is appropriate for further reliability, validity, and structural model assessment.

Discriminant Validity

Discriminant validity was examined using the Heterotrait-Monotrait Ratio (HTMT). As presented in Table 9, the HTMT value was below the recommended cut-off value of 0.85, indicating that the constructs (human capital and financial performance) were empirically distinct from one another.

Table 9: Heterotrait-Monotrait Ratio for HC and FP

HC	FP
1.000	
0.512	1.000

Therefore, the measurement model satisfied the discriminant validity criterion.

Structural Model Assessment

Following confirmation of the adequacy of the measurement model, the structural model was estimated to examine the effect of human capital on business financial performance Figure 4.

The measurement model exhibited an overall acceptable fit to the observed data based on multiple goodness-of-fit indices Figure 4. Specifically, the Comparative Fit Index (CFI = 0.909) exceeded the recommended minimum threshold of 0.90, indicating that the hypothesized model adequately reproduced the observed covariance structure (Hair et al., 2022). The Root Mean Square Error of Approximation (RMSEA = 0.013) was substantially below the recommended cut-off value of 0.06, demonstrating an excellent approximation of the model to the population covariance matrix, while the Standardized Root Mean Square Residual (SRMR = 0.072) was below the acceptable threshold of 0.08, suggesting that the discrepancies between the observed and model-implied covariance matrices were minimal (Dash & Paul, 2021; Kline, 2023).

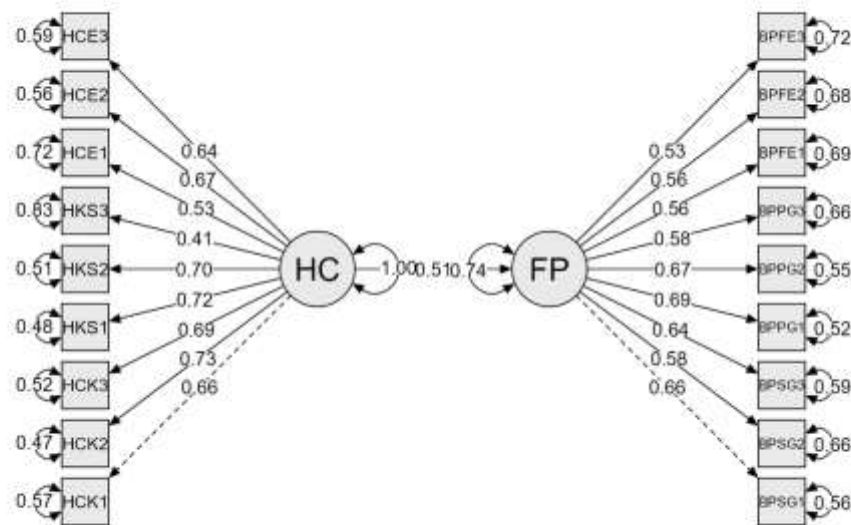


Figure 4: Structural Equation Model Illustrating the Effect of Human Capital (HC) On Financial Performance (FP) among Agro-Food Processing Smes in Western Uganda, Showing Standardized Factor Loadings and the Estimated Structural Path Coefficient

Although the Goodness-of-Fit Index (GFI = 0.796) was below the conventional benchmark of 0.90, recent structural equation modelling literature argues that GFI is highly sensitive to sample size and model complexity and is therefore considered less robust than CFI, RMSEA, and SRMR when evaluating model adequacy (Hair et al., 2022; Kline, 2023). Consequently, greater emphasis was placed on the latter indices, which collectively provide strong evidence that the measurement model adequately fits the data and is suitable for subsequent assessment of construct reliability, validity, and structural model estimation.

Hypothesis Testing

The hypothesized relationship was evaluated using bootstrapping with 5,000 resamples. Table 10 presents the standardized path coefficients (β), t-values, p-values, and confidence intervals. The results indicate that human capital exerts a positive and statistically significant effect on financial performance ($\beta = 0.508$, $t = 7.482$, $p = < 0.001$). Accordingly, the study hypothesis (H1) is supported. This finding implies that SMEs possessing higher levels of employee knowledge, skills, and experience are more likely to achieve superior financial performance in terms of sales growth, profit growth, and financial efficiency.

Table 10: Hypothesis testing

	Std. estimate	Std. Error	z-value	p	95% Confidence interval	
					Lower	Upper
HC → FP	0.508	0.068	7.482	< .001	0.375	0.641

Discussion

The findings revealed that human capital has a positive and statistically significant effect on the financial performance of agro-food processing SMEs in Western Uganda, thereby supporting the study hypothesis. This implies that SMEs with knowledgeable, skilled, and experienced employees are more likely to achieve improved sales growth, profit growth, and financial efficiency. The findings are consistent with the Resource-Based View (RBV) and the Knowledge-Based View (KBV), which posit that human capital constitutes a strategic organizational resource capable of generating sustainable competitive advantage and superior firm performance through enhanced innovation, productivity, and effective resource utilization. The results corroborate recent empirical evidence that human capital is a key driver of SME competitiveness and financial success, particularly where employees possess the competencies required to respond to dynamic market conditions and improve operational performance (Hariyono & Narsa, 2024; Xu & Wang, 2024). Similarly, the findings support those of Asiaei et al. (2023), who demonstrated that intellectual capital enhances firm performance through improved organizational capabilities, and Yadewani et al. (2024), who identified employee knowledge, skills, and abilities as critical determinants of SME performance. In the context of Uganda's agro-food processing sector, the results suggest that investments in employee development can strengthen enterprise resilience and competitiveness by improving productivity, product quality, and financial outcomes.

Conclusion

This study concludes that human capital is a significant determinant of financial performance among agro-food processing SMEs in Western Uganda. Specifically, employee knowledge, skills, and experience collectively enhance sales growth, profitability, and financial efficiency. The findings provide empirical support for the Resource-Based View and Knowledge-Based View by demonstrating that investment in human capital constitutes a strategic mechanism through which SMEs can improve their financial performance and sustain competitive advantage. The study also contributes to the intellectual capital literature by providing empirical evidence from the relatively under-researched context of agro-food processing SMEs in Uganda.

Recommendations

The findings suggest that SME owners and managers should prioritize investments in employee training, continuous skills development, and knowledge-sharing initiatives to strengthen human capital and improve financial performance. In addition, government agencies, business development service providers, and SME support institutions should design targeted capacity-building programmes that enhance technical, managerial, and entrepreneurial competencies within the agro-food processing sector. Future research should employ longitudinal designs and incorporate additional dimensions of intellectual capital, such as structural and relational capital, to provide a more comprehensive understanding of the determinants of SME financial performance.

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