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Managing the Knowledge Supply Chain: Human capital, Structural Capital and Graduate Employability: Testing Interaction Effects

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Abstract: This study examines the interaction effect of human and structural capital on graduate employability in public universities in South-Western Uganda, exploring how their combination enhances labor-market outcomes. The study adopted a positivist research paradigm with a quantitative, cross-sectional design. Data were collected from 377 graduates and 122 academic and administrative staff across Mbarara University of Science and Technology, Kabale University, and Mountains of the Moon University using self-administered questionnaires. Human capital was measured through professional competence, social competence, employee motivation, and leadership, while structural capital comprised institutional systems, infrastructure, and culture. Graduate employability was assessed through job acquisition, employment quality, career adaptability, and entrepreneurial success. Data were analyzed using SPSS and Structural Equation Modeling, with interaction effects tested using Hayes' Process Macro. Human and structural capital both significantly predict graduate employability, accounting for 42.7% of the variance. Inclusion of the interaction term revealed a significant multiplicative effect, indicating that human capital's impact on employability strengthens as structural capital increases. The results confirm that neither capital alone suffices; their synergy optimizes graduate outcomes, consistent with the knowledge supply chain perspective. Universities should jointly invest in faculty expertise and institutional infrastructure, embed employability skills into curricula, and institutionalize industry partnerships. Policymakers should implement performance-based funding, revise quality assurance frameworks to emphasize employability, and promote university-industry collaboration. This study is the first to empirically test the interactive effects of human and structural capital on graduate employability in Ugandan public universities.

Keywords: *Human capital, structural capital, graduate employability, public universities, Uganda*

1. Introduction

Graduate employability represents the final output of a knowledge supply chain in which universities transform inputs—students, faculty expertise, and institutional resources—into employable graduates who meet downstream labor market demand (Habib & Jungthirapanich, 2009; Lan & Shabir, 2024). When this supply chain functions efficiently, graduates possess the competencies employers require; when it breaks down, skills mismatches and graduate unemployment persist. Globally, evidence of supply chain failure abounds: graduates struggle to secure employment despite holding formal qualifications, reflecting persistent gaps between higher education production and labor market requirements (International Labour Organization, 2024).

In Sub-Saharan Africa, nearly half of all graduates face difficulties securing employment annually (Asumadu et al., 2022), a situation driven by weak linkages between universities and employers, limited industrial absorption capacity, and inefficient internal university processes. Uganda mirrors this challenge, with only 12.9% of its 700,000 annual graduates accessing viable formal employment, while an estimated 30.5% remain unemployed (UBOS, 2023; Mastercard Foundation, 2025). These figures signal not merely labor market constraints but fundamental inefficiencies in how Ugandan public universities configure their internal production assets to deliver employable graduates.

Within the knowledge supply chain framework, a university's intellectual capital constitutes its primary production mechanism. Two core assets are particularly critical: human capital, comprising the expertise, skills, and professional competencies of academic and administrative staff (Alfawaire & Atan, 2021); and structural capital, encompassing the institutional systems, curricula, policies, quality assurance mechanisms, and organizational routines that support knowledge application (Bontis, 1998; Kichuk et al., 2021). Human capital serves as the upstream knowledge input—the raw expertise that fuels teaching and

mentorship. Structural capital represents the downstream infrastructure that codifies, transmits, and operationalizes that knowledge into graduate competencies. Graduate employability is the ultimate output measure, signaling whether the knowledge supply chain is functioning effectively.

Prior research confirms that human capital positively influences graduate employability (Clarke, 2018; Donald et al., 2024). However, from a supply chain perspective, no single asset operates in isolation. The effectiveness of upstream inputs depends on the strength of downstream infrastructure. Structural capital provides the enabling systems—curriculum frameworks, internship coordination, quality assurance processes—that translate faculty expertise into tangible graduate outcomes (Hassan et al., 2022). Without robust structural capital, human capital remains tacit, underutilized, and unable to scale its impact across the institution (Beltramino et al., 2020).

Intellectual capital scholarship emphasizes that organizational outcomes emerge from the complementary interaction of human and structural capital rather than from their isolated effects (Kamukama et al., 2010; Huang et al., 2021). When these assets are integrated within a well-managed knowledge supply chain, they create synergies that produce outcomes greater than the sum of their individual contributions—a principle consistent with the Resource-Based View's emphasis on resource complementarity (Barney et al., 2021). Friedrich (1982) argues that when multiple predictors interact, their combined influence may exceed the sum of their main effects, making interaction analysis essential for understanding how supply chain assets jointly determine output quality.

Despite this theoretical foundation, empirical research examining how human and structural capital interact within the knowledge supply chain to influence graduate employability remains limited, particularly in public universities in developing countries (Salinas-Ávila et al., 2020; Ali et al., 2022). Most existing studies adopt additive models that overlook how institutional structures condition the effectiveness of staff expertise. This gap is especially problematic in Uganda, where weak structural capital—underfunding, limited infrastructure, inadequate industry partnerships—may constrain universities' ability to translate available human capital into employable graduate outcomes (Sophia & Onen, 2024). It remains unclear whether investments in faculty development yield maximum returns only when accompanied by strong institutional systems.

Accordingly, this study examines the interaction between human capital and structural capital in shaping graduate employability in Ugandan public universities, using the knowledge supply chain as the organizing conceptual lens. By testing whether structural capital strengthens the effect of human capital on graduate employability, the study advances understanding of how universities can more effectively manage their intellectual capital assets to optimize graduate outcomes. Understanding this nexus is essential for informing higher education reforms, strengthening university-industry linkages, and supporting Uganda's broader development agenda as articulated in Vision 2040 and the National Development Plan IV.

Theoretical Framework

Human Capital Theory

Human Capital Theory, introduced by Schultz (1972) and developed by Becker (1993) emphasizes the role of education and training in enhancing individuals' productivity, competitiveness, and employability. It views human capital as the combination of knowledge, skills, and experiences that increase one's value in the labor market (Tomlinson, 2017; Mgaiwa, 2021). The theory posits that investment in education leads to higher productivity and economic growth, with the labor market rewarding individuals based on their human capital attributes such as qualifications and skills (Nwajiuba et al., 2020). In relation to this study, the theory is relevant because public universities are expected to equip graduates with knowledge and competencies that enhance their employability and readiness for the labor market (Pitan & Muller, 2019). However, the theory has been criticized for assuming that education automatically translates into employment and for overlooking factors such as labor market conditions, creativity, and informal learning opportunities (Tholen, 2020). Despite these limitations, Human Capital Theory provides a foundation for examining how investments in higher education influence graduate employability, particularly in the context of public universities in South-Western Uganda.

Resource-Based View

The Resource-Based View, introduced by Wernerfelt (1984) and refined by Barney (1991) emphasizes that an organization's internal resources are critical sources of competitive advantage. It posits that resources that are valuable, rare, inimitable, and non-substitutable enable sustained competitive advantage (Barney, 2001). Crucially, the theory recognizes that resources rarely create value independently; human and structural capital function as complementary assets whose joint deployment enhances organizational outcomes (Shubita, 2023). In the knowledge supply chain, human capital (staff expertise) serves as the upstream input, while structural capital (institutional systems, curricula, quality assurance mechanisms) provides the infrastructure that codifies and transmits this knowledge to students (Beltramino et al., 2020). The theory is relevant to this study because it establishes the theoretical basis for why human and structural capital must interact to produce employable graduates, with neither asset sufficient alone (Kamukama et al., 2010). However, RBV has been criticized for offering limited insight into how resources are adapted over time to maintain alignment with changing environments (Kero & Bogale, 2023). Despite this limitation, RBV provides the foundation for examining how human and structural capital jointly influence graduate employability in Ugandan public universities.

Dynamic Capabilities View

The Dynamic Capabilities View, articulated by Teece et al. (1997) and subsequently refined (Teece, 2016; 2023) addresses RBV's limitations by explaining how organizations integrate, develop, and reconfigure resources in response to rapidly changing environments. Dynamic capabilities comprise three core activities: sensing (identifying opportunities and threats), seizing (mobilizing resources to respond), and reconfiguring (modifying existing assets to accommodate change) (Teece, 2026). In the knowledge supply chain, human capital underpins sensing by enabling organizations to interpret labor market signals, while structural capital supports seizing by embedding this knowledge into institutional systems and processes (Ahmed et al., 2024; Chavarnakul, 2025). The theory is relevant to this study because it provides the causal mechanism through which human and structural capital interact: universities with strong dynamic capabilities are better able to continuously align staff expertise and institutional systems with evolving employer demands (Siegel & Leih, 2018). Studies confirm that dynamic capabilities strengthen the effect of intellectual capital on performance outcomes (Ali et al., 2021). Thus, the Dynamic Capabilities View offers an overarching framework for understanding how and why human and structural capital interact to enhance graduate employability in public universities in South-Western Uganda.

2. Literature review

Graduate Employability

Graduate employability refers to the capacity of graduates to secure, maintain, and progress in suitable employment (Behle, 2020). It encompasses both individual attributes and institutional factors that shape labor market outcomes (Clarke, 2018). Within the knowledge supply chain, graduate employability represents the final output measure—the extent to which the university's production process delivers graduates who meet employer specifications (Habib & Jungthirapanich, 2009; Chowdhury et al., 2025). The concept is operationalized as demonstrated labor market success, comprising four observable outcome dimensions: job acquisition, capturing graduates' success in securing initial employment through effective job search processes (Jackson, 2014; Clarke, 2018); employment quality, assessing job-match, compensation adequacy, and long-term career potential (Lindberg, 2007; Roshchin & Rudakov, 2015); career adaptability, reflecting graduates' readiness to cope with career-related tasks, transitions, and changes (Savickas & Porfeli, 2012; Koen et al., 2012); and entrepreneurial success, conceptualizing self-employment and venture creation as a valid pathway for labor market integration (Breznitz & Zhang, 2020; Kozlinska et al., 2023). While extensive research examines graduate employability in Western contexts (Römgens et al., 2020; Donald et al., 2024), limited attention has been paid to developing countries like Uganda, where labor market structures and university resources differ substantially (Igwe et al., 2022; Damoah et al., 2021).

Human Capital and Graduate Employability

Human capital comprises the knowledge, skills, competencies, and attributes embodied in individuals that enhance their productive capacity (Becker, 1993; OECD, 2022). In the knowledge supply chain, human capital constitutes the upstream input—the expertise of academic and administrative staff that fuels teaching,

mentorship, and curriculum development (Romano et al., 2025; Otermans et al., 2025). Within universities, human capital encompasses the explicit and tacit knowledge of academics, researchers, managers, and administrative staff, acquired through formal education, training, and professional experience (Cricelli et al., 2018; de Matos Pedro et al., 2022). Key dimensions include professional competence, social competence, employee motivation, and leadership ability (Sharma, 2021; Ilhamsyah & Purwanto, 2025). Unlike physical assets, human capital is portable—employees retain it beyond their organizational affiliation, making its development and retention strategically critical (Bucăţa & Tileagă, 2023; Serenko et al., 2024).

A substantial body of research confirms that human capital positively influences graduate employability (Clarke, 2018; Römgens et al., 2020; Abelha et al., 2020; Donald et al., 2024). Faculty expertise shapes teaching quality, curriculum relevance, and student skill development, directly affecting graduates' labor market readiness. (Borah & Malik, 2021; Rajaram, 2023). Academics with industry experience impart employer-desired skills, leading to higher graduate employment rates (Hassock & Hill, 2022; Sultanova et al., 2018). Studies in developing countries reinforce these findings. Chigbu and Nekhwevha (2022) found that well-developed academic staff is crucial for enhancing graduates' labor market readiness in South Africa. Cricelli et al. (2018) demonstrated that Colombian universities with high-quality human capital produce graduates with industry-valued skills. However, Okolie et al. (2020) identified constraints in Nigerian universities, including shortages of trained academics, limiting institutions' capacity to equip graduates with relevant competencies. Despite this evidence, scholars caution that human capital alone does not guarantee graduate employment (Clarke, 2018; Abelha et al., 2020). Contextual factors—including institutional systems, curriculum design, and employer engagement—moderate the human capital–employability relationship (Robson, 2023; Tamrat, 2022). This suggests that human capital's effectiveness depends on the supporting institutional environment. Based on this literature, the following hypothesis is proposed: Human capital is positively related to graduate employability in public universities in South-Western Uganda (H_1).

Structural Capital and Graduate Employability

Structural capital comprises the institutionalized knowledge, systems, processes, and infrastructure that support organizational functioning (Bontis, 1998; Astuti et al., 2023). In the knowledge supply chain, structural capital represents the production infrastructure—the enabling environment within which human capital operates to transform inputs into outputs (Sutrisno et al., 2024). In universities, structural capital encompasses curricula, information systems, quality assurance mechanisms, governance frameworks, libraries, databases, patents, organizational culture, and industry partnerships (Salinas-Ávila et al., 2020; de Matos Pedro et al., 2020; Ramírez & Gordillo, 2014). Unlike human capital, structural capital remains with the institution even when individuals leave, providing enduring value (Mukaro et al., 2023). It codifies tacit knowledge into explicit organizational assets, enabling knowledge retention and transfer (Bratianu, 2017; Wang et al., 2021).

Empirical evidence demonstrates that robust structural capital enhances graduate employability. Universities with well-developed systems, supportive learning environments, and industry-aligned curricula produce graduates with better labor market outcomes (Ng et al., 2021; Nwajiuba et al., 2020). Curriculum relevance is critical: programs aligned with industry requirements improve graduate employment prospects (Mgaiwa, 2021). Learning infrastructure, including well-functioning libraries, digital platforms, and online resources, promotes skill development (Nwajiuba et al., 2020; Mintz, 2024). Industry linkages providing internships and work experience enhance employability (Jackson, 2021; Ian et al., 2020). Furthermore, clear pathways between academic programs and occupational fields facilitate labor market entry (Päivi et al., 2023; Stronati, 2023).

International comparisons reveal that countries with strong vocational education systems and structured program–occupation linkages, such as Germany and the Netherlands, create defined pathways for graduates, whereas systems with weaker alignment produce more generalized competition (Araki, 2020; Isopahkala-Bouret & Tholen, 2023). However, the relationship is not deterministic. Wright and Wei (2022) found that elite university attendance does not guarantee employment; supplementary experiences such as internships, networks, and credentials prove more determinative. Kato et al. (2020) demonstrated that skills developed outside traditional university settings can be equally competitive, challenging assumptions about structural capital's primacy. Based on this literature, the following hypothesis is proposed: Structural capital is positively related to graduate employability in public universities in South-Western Uganda (H_2).

Interaction Between Human and Structural Capital

Intellectual capital scholarship emphasizes that organizational outcomes emerge from the synergistic interaction of human and structural capital rather than from their isolated effects (Edvinsson & Malone, 1997; Kamukama et al., 2010; Huang et al., 2021). These components function as complementary assets: human capital generates knowledge and innovation, while structural capital captures, codifies, and scales that knowledge across the organization (Bontis, 1998; Ibarra-Cisneros et al., 2023). In the knowledge supply chain, this interaction represents the value-adding transformation—the point at which upstream inputs of staff expertise combine with production infrastructure of institutional systems to generate outputs of employable graduates (Zheng et al., 2024). The relationship is reciprocal: human capital develops and renews structural capital through research, curriculum innovation, and knowledge creation (Ahmad & Wu, 2022; Wahyudi et al., 2025), while structural capital provides the infrastructure that enables human capital to be mobilized, coordinated, and embedded within organizational processes (Boikanyo, 2025; Kucharska, 2022). Without structural capital, human capital remains tacit and underutilized; without human capital, structural capital lacks the content and insight needed for relevance (Jardon & Martinez-Cobas, 2021; Sutrisno et al., 2024). Their combination creates a unique resource that contributes to innovation capability and organizational performance (Oliveira et al., 2020; Shiyuan et al., 2022).

In higher education contexts, this synergy directly affects graduate employability. Skilled faculty develop innovative curricula and pedagogy, while strong institutional systems ensure these innovations are embedded, scaled, and sustained (Donald et al., 2024; de Matos Pedro et al., 2020). Structural capital ensures that student learning, internships, and industry engagement fully translate faculty expertise into employable competencies. Asiedu et al., 2023). The interaction enables universities to codify tacit knowledge, foster knowledge sharing, and systematically enhance graduate outcomes (Vélez-rolón et al., 2021; Serenko et al., 2024). Empirical evidence supports this interactive effect. Salinas-Ávila et al. (2020) found a symbiotic relationship between human and structural capital in Colombian university research settings. Yazdani et al. (2022) identified positive correlations in entrepreneurial universities. However, findings are not uniform: Kianto et at. (2017) found no discernible correlation in Spanish firms, and Rampa and Agogué (2021) Suggested human capital alone may be negatively associated with radical innovation capability, underscoring the need for interaction analysis. Despite growing recognition of intellectual capital's importance in universities (Bellucci et al., 2021; Strazzullo et al., 2022)Research on how human and structural capital interact to shape graduate employability remains limited, particularly in developing countries (Salinas-Ávila et al., 2020; Ali et al., 2022). Most studies adopt additive models that overlook how institutional structures condition the effectiveness of staff expertise. Friedrich, (1982) argues that when multiple predictors interact, their combined influence may exceed the sum of their main effects, making interaction analysis essential for uncovering underlying relationships. Based on this literature, the following hypothesis is proposed: Human capital influences graduate employability through interaction with structural capital in public universities in South-Western Uganda (H_3).

3. Study design and methodology

The study adopted a positivist paradigm with a quantitative, cross-sectional design to examine the interaction between human capital and structural capital on graduate employability (Cresswell, 2019; Saunders et al., 2019). Data were collected from 377 graduates and 122 academic and administrative staff across three public universities in South-Western Uganda: Mbarara University of Science and Technology, Kabale University, and Mountains of the Moon University. Graduates from the 2019, 2022, and 2023 cohorts were selected using simple random sampling proportionate to each university's graduate population (Yamen, 1973; Lohr, 2022), while staff occupying strategic roles (faculty deans, department heads, quality assurance officers, and human resource directors) were purposively selected using a census approach (Pahwa et al., 2023; Memon et al., 2025).

Self-administered questionnaires, adapted from validated instruments, measured human capital through professional competence, social competence, employee motivation, and leadership ability (Sveiby, 2001; Petty & Guthrie, 2000; Sharma, 2021), structural capital through institutional systems, infrastructure, and culture (Bontis, 2002; Kamukama et al., 2010) and graduate employability through job acquisition, employment quality, career adaptability, and entrepreneurial success (Fugate et al., 2004; Jackson, 2013; Tomlinson, 2017), all on five-point Likert scales (Kusmaryono et al., 2022). Content validity was confirmed through expert review,

with content validity indices exceeding 0.60 for all constructs (Lynn, 1986; Masuwai et al., 2024), while confirmatory factor analysis established convergent validity with composite reliability values between 0.82 and 0.91 and average variance extracted between 0.51 and 0.67, all exceeding recommended thresholds (Hair et al., 2010; Fornell & Larcker, 1981). Discriminant validity was confirmed as the square root of each construct's AVE exceeded its correlations with other constructs (Fornell & Larcker, 1981). Common method bias was mitigated through procedural remedies, including sourcing independent and dependent variables from different respondents and protecting respondent anonymity (Podsakoff et al., 2003; Podsakoff, 2012), with Harman's single-factor test indicating no single factor explained more than 38.5% of variance.

Data were analyzed using SPSS Version 26, with interaction effects tested through hierarchical regression. Aiken and West's (1991) procedures: predictor variables were mean-centered, an interaction term (human capital × structural capital) was created, and a simple slopes analysis was conducted to probe significant interactions (Hayes, 2022). All parametric assumptions, including normality, linearity, homoscedasticity, and multicollinearity, were tested and satisfied.(Tabachnick & Fidell, 2019; Field, 2018), with tolerance values ranging from 0.663 to 0.96 and VIF values from 1.041 to 1.509, all within acceptable limits (Hair et al., 2010). Ethical approval was obtained from the MUST Research Ethics Committee and the National Council of Science and Technology, with informed consent obtained and respondent confidentiality assured throughout.

4. Results

Sample characteristics

The study analyzed data from 377 graduates and 122 academic and administrative staff across three public universities in South-Western Uganda: Mbarara University of Science and Technology (MUST), Kabale University (KAB), and Mountains of the Moon University (MMU), representing response rates of 98.7% and 84.1%, respectively. Among graduates, gender representation was balanced (53.1% male, 46.9% female), with the majority aged 20–29 years (54.1%) and holding bachelor's degrees (70%). Graduates were distributed across cohorts: 2019 (31.8%), 2022 (32.6%), and 2023 (35.5%). At the time of the survey, 51.5% were unemployed, 31.8% formally employed, 9.5% pursuing further studies, and 7.2% self-employed. University staff respondents were predominantly male (54.9%), aged 40 years and above (85.2%), and highly qualified, with 54.1% holding doctoral degrees and 45.9% holding master's degrees. The majority had served nine or more years (54.9%) and occupied middle management positions (58.2%), primarily as department heads (63.1%).

Descriptive Statistics

Table 1 presents descriptive statistics for the study constructs. Mean scores ranged from 3.97 to 4.18 on a five-point scale, indicating moderately high perceptions across all constructs. Standard deviations were low (0.38 to 0.46), suggesting responses clustered closely around the means.

Table 1: Means and Standard Deviations for Constructs

Global variables	Min	Max	Mean	Std. Dev
Human capital	2	4.79	4.071	0.457
Structural capital	1.85	4.23	3.971	0.384
Employability skills	2.08	4.5	4.176	0.455
Graduate employability	2.47	4.43	3.966	0.380

Confirmatory Factor Analysis

Confirmatory factor analysis (CFA) was conducted to validate the measurement models for all constructs before hypothesis testing. Following established guidelines (Hair et al., 2019; Kline, 2023)Items with weak factor loadings were sequentially removed to achieve parsimonious and well-fitting models. The final human capital measurement model retained six items with standardized factor loadings ranging from 0.658 to 0.774 (all $p < .001$). Model fit indices indicated excellent fit: CMIN/DF = 2.728, GFI = 0.987, CFI = 0.988, TLI = 0.974, NFI = 0.981, RMSEA = 0.059. Composite reliability (CR = 0.81) exceeded the 0.70 threshold, and average variance extracted (AVE = 0.63) exceeded 0.50, confirming reliability and convergent validity.

The final structural capital measurement model retained five items with standardized factor loadings from 0.721 to 0.884 (all p < .001). Model fit indices demonstrated excellent fit: CMIN/DF = 1.623, GFI = 0.990, CFI = 0.995, TLI = 0.988, NFI = 0.987, RMSEA = 0.036. CR (0.84) and AVE (0.61) confirmed reliability and validity.
Graduate employability was modeled as a second-order construct comprising three dimensions: job acquisition, employment quality, and entrepreneurial success. Career adaptability was dropped during refinement due to statistical weaknesses. The final model retained eleven indicators with standardized loadings from 0.66 to 0.87 (all p < .001). Model fit was acceptable: CMIN/DF = 2.13, GFI = 0.931, CFI = 0.952, TLI = 0.931, NFI = 0.915, RMSEA = 0.058. CR values ranged from 0.82 to 0.88, and AVE values from 0.61 to 0.65, all exceeding recommended thresholds. Discriminant validity was confirmed as the square root of each construct's AVE exceeded its correlations with other constructs, satisfying the Fornell-Larcker criterion.

Correlation analysis
Table 2 presents zero-order correlations among the study variables. All correlations were positive and statistically significant (p < .01).

Table 2: Zero-order correlation between human and structural capital and graduate employability
Regression analysis

Variables	HC	SC	GE
Human Capital (HC)	**1**		
Structural capital (SC)	**.124****	**1**	
Graduate Employability (GE)	**.551****	**.482****	**1**

Note: ****Correlation is significant at the 0.01 level (one-tailed).**

Human capital demonstrated a significant positive correlation with graduate employability (r = .551, p < .01), providing initial support for Hypothesis 1. Structural capital also correlated positively and significantly with graduate employability (r = .482, p < .01), supporting Hypothesis 2.

Interaction Analysis
To test Hypothesis 3 (H_3)—that human capital influences graduate employability through interaction with structural capital—hierarchical regression analysis was conducted following Aiken and West's (1991) procedures. Predictor variables were mean-centered to reduce multicollinearity, and an interaction term (human capital × structural capital) was created as the product of the centered variables.
Table 3 presents the hierarchical regression results.

Table 3: Regression of graduate employability on human, structural capital and interaction term

	Model 1		Model 2		Model 3	
	B	Sig	B	Sig	B	Sig
Constant	1.972	.000	.835	.000	2.823	.001
Human Capital	.402	.000	.304	.000	-.257	.259
Structural capital			.451	.000	-.151	.537
HC*SC (Interaction effect)					.169	.013
R	.482[a]		.653[b]		.659[c]	
R Square	.233		.427		.434	
Adjusted R-Square	.231		.424		.430	
R Square Change	.233		.194		.007	
F Change	149.417		166.598		6.180	
Sig. F Change	.000		.000		.013	
Sig. (ANOVA)	.000		.000		.000	

Note: ***p<.001, N=499,
HC*SC = *Interaction term*

Source: Primary Data
**Note: HC and SC are mean-centered; coefficients in Model 3 represent conditional effects when the other variable is at its mean (zero). **

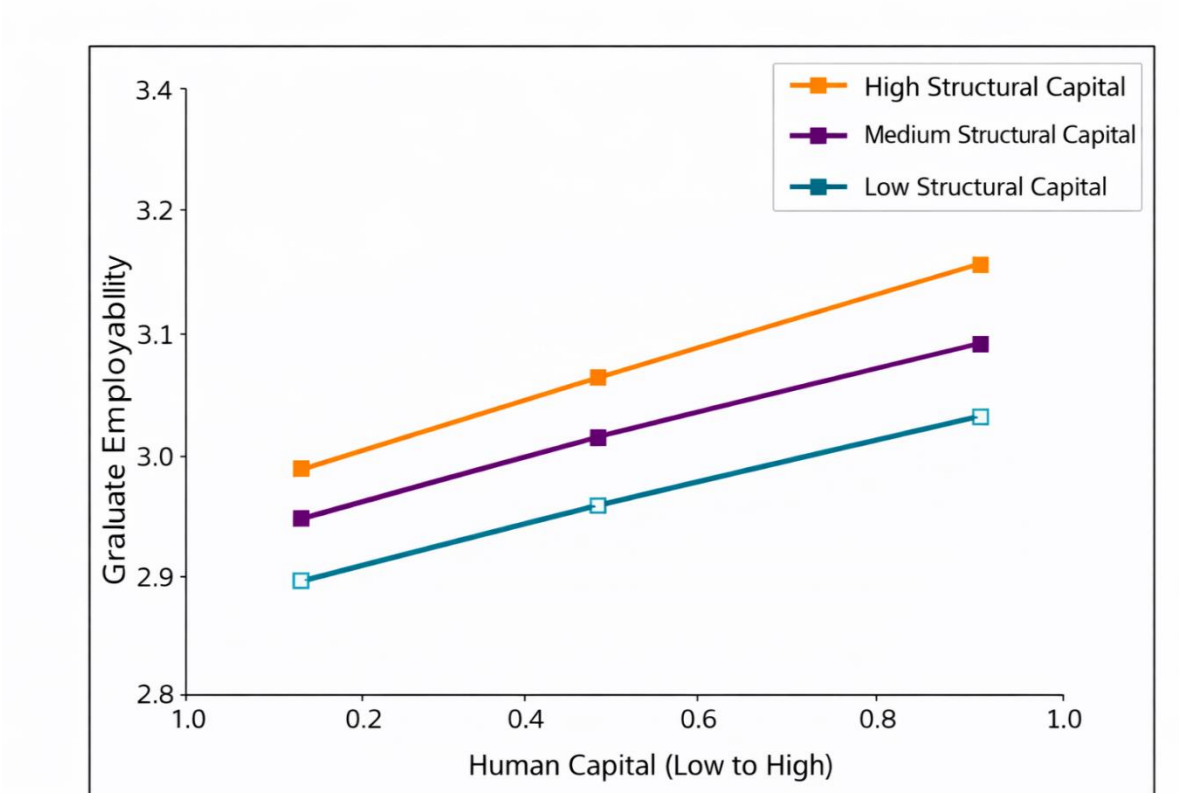
Model 1 regressed graduate employability on human capital alone, showing a significant positive effect (β = 0.402, $p < .001$) and explaining 23.3% of the variance. Model 2 added structural capital, which also had a significant positive effect (β = 0.451, $p < .001$), with both predictors collectively explaining 42.7% of the variance. The significant R^2 change (ΔR^2 = 0.194, $p < .001$) confirmed that structural capital uniquely contributes to graduate employability beyond human capital.

Model 3 introduced the interaction term (human capital × structural capital). The interaction effect was positive and statistically significant (β = 0.169, p = .013), indicating that the effect of human capital on graduate employability depends on the level of structural capital. The inclusion of the interaction term produced a small but significant increase in explained variance (ΔR^2 = 0.007, p = .013).

In Model 3, the main effects of human capital (β = -0.257, p = .259) and structural capital (β = -0.151, p = .537) became non-significant. This is a standard outcome in moderation analysis with mean-centered predictors: these coefficients now represent conditional effects when the other predictor is at its mean value, not average effects across all observations. (Aiken & West, 1991; Hayes, 2022). The non-significance indicates that, for universities with average levels of structural capital, the unique effect of human capital is not distinguishable from zero, illustrating precisely the conditional nature of the relationship.

To interpret the significant interaction, a simple slopes analysis was conducted. Aiken and West (1991). The conditional effect of human capital on graduate employability was calculated at three levels of structural capital: low (one standard deviation below the mean), average (at the mean), and high (one standard deviation above the mean). Figure 1 presents the graphical representation of these simple slopes.

Figure 1: Interaction Effect of Human Capital and Structural Capital on Graduate Employability



Note: Low = one standard deviation below the mean of structural capital; Medium = mean of structural capital; High = one standard deviation above the mean of structural capital.

The simple slopes analysis revealed that the effect of human capital on graduate employability strengthens as structural capital increases. At low levels of structural capital, the relationship between human capital and

graduate employability is relatively weak. At average levels of structural capital, the relationship is moderate. At high levels of structural capital, the relationship is strongest, with the steepest positive slope. The non-parallel lines in Figure 1 confirm the presence of a significant multiplicative interaction. (Aiken & West, 1991; Jose, 2008).

These results support Hypothesis 3 (H_3): human capital significantly influences graduate employability through its interaction with structural capital. The synergistic effect indicates that investments in human capital yield greater returns in terms of graduate employability when supported by robust institutional structures, systems, and resources. Conversely, the impact of human capital is attenuated when structural capital is weak.

Discussion

The positive relationship between human capital and graduate employability ($\beta = 0.460$, $p < .001$) supports Hypothesis 1, confirming that universities with stronger staff professional competence, motivation, and leadership produce graduates with better labor market outcomes. Within the knowledge supply chain, upstream human capital inputs effectively translate into downstream graduate competencies. (Romano et al., 2025). When staff quality is high, the knowledge reservoir available for transmission to students is deeper, directly enhancing the final product's market readiness. This finding aligns with Human Capital Theory. (Becker, 1993) and corroborates evidence that well-developed university staff produce graduates with industry-valued skills (Cricelli et al., 2018; Chigbu & Nekhwevha, 2022). In resource-constrained contexts like Uganda, high-quality human capital functions as a critical adaptive mechanism, compensating for infrastructural deficits (Annala et al., 2023). The finding elevates human capital from a generic input to the primary value-adding node in the knowledge supply chain.

The significant relationship between structural capital and graduate employability ($\beta = 0.258$, $p < .001$) supports Hypothesis 2, indicating that robust institutional systems, infrastructure, and organizational culture enhance graduate outcomes. In the knowledge supply chain, structural capital constitutes the production infrastructure enabling efficient knowledge flow from faculty to students. (Sutrisno et al., 2024). This aligns with evidence that curriculum relevance, learning infrastructure, and quality assurance systems shape graduate employability. (Nwajiuba et al., 2020; Mgaiwa, 2021). From a Resource-Based View perspective (Barney, 1991), structural capital represents a valuable asset that embeds employability into organizational memory, making graduate outcomes less dependent on isolated staff excellence and more resilient to turnover. (Mukaro et al., 2023). This institutionalization transforms individual efforts into a reliable supply chain.

The central contribution of this study is the positive and significant interaction effect between human and structural capital on graduate employability ($\beta = 0.169$, $p = .013$), supporting Hypothesis 3. This interaction indicates that the effect of human capital is conditional upon structural capital: improvements in human capital translate into higher graduate employability when supported by strong institutional systems, but this effect diminishes when structural capital is weak. Simple slopes analysis confirmed that the positive relationship is strongest at high levels of structural capital and weakest at low levels—demonstrating a multiplicative, non-additive effect. (Aiken & West, 1991; Hayes, 2022).

The statistically significant interaction effect ($\beta = 0.169$, $p = .013$) adds 0.7% explained variance beyond the main effects model. While this increment appears modest, in social science research, interaction effects typically explain 1–3% of variance, with even small effects considered meaningful when they demonstrate consistent patterns across conditions. (Aiken & West, 1991; McClelland & Judd, 1993). More importantly, the simple slopes analysis reveals substantively meaningful variation: the effect of human capital shifts from weak at low levels of structural capital to strong at high levels. This conditional pattern has practical implications, suggesting that investments in faculty development yield substantially greater returns when accompanied by parallel investments in institutional infrastructure.

From a knowledge supply chain perspective, this confirms that the integration point between upstream inputs (human capital) and production infrastructure (structural capital) is where value is created. When these nodes operate in isolation, knowledge exists in faculty minds but lacks systems to be codified and transmitted into

student competencies. (Muna et al., 2023). The interaction effect provides evidence that the supply chain functions as an integrated system, not a collection of independent parts.

This finding aligns with intellectual capital scholarship, emphasizing that organizational outcomes emerge from synergistic interaction rather than isolated effects (Edvinsson & Malone, 1997; Kamukama et al., 2010). Human capital develops and renews structural capital through curriculum innovation, while structural capital provides the infrastructure enabling human capital to be mobilized (Wahyudi et al., 2025). Without structural capital, human capital remains tacit and underutilized; without human capital, structural capital lacks the content needed for relevance (Jardon & Martinez-Cobas, 2021). Empirical evidence from Colombian and entrepreneurial universities supports this interactive effect (Salinas-Ávila et al., 2020; Yazdani et al., 2022), and this study extends it to graduate employability in a developing country context.

Theoretically, these results support an integrated Resource-Based View and Dynamic Capabilities perspective. Competitive advantage in producing employable graduates stems not merely from possessing valuable resources but from the dynamic capability to integrate and orchestrate them. (Donald et al., 2024; Teece, 2023). Human capital provides sensing capabilities—interpreting labor market signals—while structural capital supports seizing by embedding this knowledge into institutional systems. (Ahmed et al., 2024). The practical implication is clear: universities investing in staff development in isolation from investments in curricula, digital infrastructure, and career services will yield suboptimal returns. The greatest gains in graduate employability are achieved through integrated initiatives that simultaneously enhance faculty capacity and the institutional platforms channeling that capacity toward student development.

This finding addresses a critical gap. While individual effects of human and structural capital are acknowledged (Mukaro et al., 2023; Sutrisno et al., 2024), empirical evidence on their synergistic interaction in shaping graduate employability has been scarce, particularly in developing country public universities (Salinas-Ávila et al., 2020; Ali et al., 2022). By demonstrating that the effect of human capital is conditional on structural capital, this study moves beyond additive models to explain how these intellectual capital components jointly enhance graduate outcomes. In knowledge supply chain terms, the interaction effect reveals that the whole system outperforms the sum of its parts when integration is achieved.

5. Conclusion and Recommendations

This study concludes that graduate employability in South-Western Ugandan public universities is driven by the synergistic interaction of human and structural capital, with neither alone sufficient to maximize graduate outcomes. Human capital, encompassing faculty and staff competence, motivation, and leadership, and structural capital, comprising institutional systems, infrastructure, and culture, operate multiplicatively rather than independently, confirming the relevance of the knowledge supply chain perspective in tracing how upstream inputs are transformed into labor-market-relevant competencies. Theoretical implications include evidence that these capitals are distinct, multi-dimensional predictors of employability and that contextual adaptation of existing models is necessary for Ugandan universities. The study advances understanding by empirically confirming the synergistic interaction between human and structural capital, moving beyond additive models to explain how intellectual capital components jointly enhance graduate outcomes.

Managerially, universities should strategically invest in faculty expertise and institutional infrastructure, embed employability skills across curricula, and institutionalize career support and industry partnerships to optimize transformation processes. At the policy level, national authorities should implement performance-based funding, revise quality assurance frameworks to evaluate institutional capacity for employability outcomes, and promote university-industry collaboration, including work-integrated learning and graduate tracking systems, to ensure the higher education system responds to labor market needs. Coordinated interventions across universities and policy frameworks will strengthen the knowledge supply chain, ensuring that institutional resources are systematically converted into employable graduates and sustained higher education impact.

Limitations of the study

The findings of this study are subject to limitations that provide directions for future research. Although the constructs were precisely defined through literature and validated by experts, the measurements may not perfectly capture all dimensions of human capital, structural capital, and graduate employability. Notably, the career adaptability dimension of graduate employability was dropped during confirmatory factor analysis due to statistical weaknesses. This suggests that Western-derived employability frameworks may not fully transfer to the Ugandan context, underscoring the need for contextually grounded measures developed specifically for Sub-Saharan African higher education settings. The study employed a single methodological approach; future research could adopt mixed-methods designs to triangulate findings and longitudinal designs to examine dynamic effects over time. Despite these limitations, the results provide valuable insights into the interactive effect of human and structural capital on graduate employability outcomes in Ugandan public universities.

References

Abelha, M., Fernandes, S., Mesquita, D., Seabra, F., & Ferreira-Oliveira, A. T. (2020). Graduate employability and competence development in higher education: A systematic literature review using PRISMA. *Sustainability (Switzerland)*, *12*(15). https://doi.org/10.3390/SU12155900

Ahmed, S., Aziz, N. A., Haque, R., Bin, A. R., Senathirajah, S., & Qazi, S. Z. (2024). Digital transformation in Malaysian manufacturing : a study of change sensing and seizing capabilities. *Cogent Business & Management*, *11*(1). https://doi.org/10.1080/23311975.2024.2392046

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions*. SAGE Publications, Inc.

Alfawaire, F., & Atan, T. (2021). *The Effect of Strategic Human Resource and Knowledge Management on Sustainable Competitive Advantages at Jordanian Universities : The Mediating Role of Organizational Innovation*.

Ali, M. A., Hussin, N., Haddad, H., Alkhodary, D., & Marei, A. (2021). *Dynamic Capabilities and Their Impact on Intellectual Capital and Innovation Performance*.

Ali, Q. B., Bin Mohd Zin, M. L., & Bin Ismail, S. A. (2022). The Mediating Role of Innovation on The Relationship Between Intellectual Capital and Private Universities' Performance in Pakistan. *International Journal of Academic Research in Business and Social Sciences*, *12*(7). https://doi.org/10.6007/ijarbss/v12-i7/14113

Andy Field. (2018). *Discovering Statistics Using IBM SPSS Statistics* (5th Edition). SAGE Publications.

Annala, J., Lindén, J., Mäkinen, M., & Henriksson, J. (2023). *Understanding academic agency in curriculum change in higher education*. *2517*. https://doi.org/10.1080/13562517.2021.1881772

Araki, S. (2020). Educational Expansion, Skills Diffusion, and the Economic Value of Credentials and Skills. In *American Sociological Review* (Vol. 85, Issue 1). https://doi.org/10.1177/0003122419897873

Asiedu, E., Boakye, A. N., Malcalm, E., & Amoah, C. K. (2023). Institutional Strategies and Graduate Employability Development Skills of Business Students: The Mediating Role of Graduate Capital Forms. *ICRRD Quality Index Research Journal*, *4*(3), 157–181. https://doi.org/10.53272/icrrd.v4i3.7

Astuti, P. D., Datrini, L. K., & Chariri, A. (2023). Understanding the Antecedents and Consequences of Sustainable Competitive Advantage: Testing Intellectual Capital and Organizational Performance. *Economies*, *11*(4). https://doi.org/10.3390/economies11040120

Asumadu, G., Ofori, D., Adomako, S., & Sefa, E. O. (2022). The Two Sides of the Coin of Youth Unemployment: Government and the Unemployed Individual. *Asian Journal of Economics, Business and Accounting*, *22*(24), 133–140. https://doi.org/DOI: 10.9734/AJEBA/2022/v22i24901

Barney, J. B., Ketchen, D. J., & Wright, M. (2021). Resource-Based Theory and the Value Creation Framework. *Journal of Management, 47*(7), 1936–1955.

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

Barney, J. A. Y. B. (2001). *Is the Resource-Based " View " a Useful Perspective for Strategic Management Research ?*

Becker, G. S. (1993). *Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education (3rd ed.). Chicago: University of Chicago Press.* https://doi.org/http://dx.doi.org/10.7208/chicago/9780226041223.001.0001

Behle, H. (2020). Students' and graduates' employability. A framework to classify and measure employability gain. *Policy Reviews in Higher Education*, *4*(1), 105–130. https://doi.org/10.1080/23322969.2020.1712662

Bellucci, M., Marzi, G., Orlando, B., & Ciampi, F. (2021). Journal of Intellectual Capital: a review of emerging themes and future trends. *Journal of Intellectual Capital*, *22*(4), 744–767. https://doi.org/10.1108/JIC-10-2019-0239

Beltramino, N. S., García-Pérez-de-Lema, D., & Valdez-Juárez, L. E. (2020). The structural capital, the innovation and the performance of the industrial SMES. *Journal of Intellectual Capital*, *21*(6), 913–945. https://doi.org/10.1108/JIC-01-2019-0020

Boikanyo, D. H. (2025). *Structural Capital Management and Knowledge Sharing to Enhance Employee Engagement in the Modern Era*.

Bontis, N. (2002). *There is a price on your head: managing intellectual capital strategically, Business Quarterly, summer, pp.40 – 47.*

Bontis, N. (1998). Mapping the human capital management research trends using bibliometric analysis. *Management Decision*, *36*(2), 63–76.

Bratianu, C., & B. R. (2017). Knowledge strategies for increasing IC of universities.In European Conference on Intangibles and Intellectual Capital (p. 34). *Academic Conferences International Limited.*

Breznitz, S.M., Zhang, Q. (2020). Determinants of graduates' entrepreneurial activity. *Small Bus Econ*, *55*, 1039–1056. https://doi.org/https://doi.org/10.1007/s11187-019-00171-8

Bucăţa, G., & Tileagă, C. (2023). The Role of Human Capital in the Universities' Management Efficiency Process. *Land Forces Academy Review*, *28*(2), 136–147. https://doi.org/10.2478/raft-2023-0017

Chavarnakul, T. (2025). *ODU Digital Commons: A Systematic Literature Review on Resilient Digital Transformation, Examining How Organizations Sustain Digital Capabilities*. *6*(2), 687–722.

Chigbu, B. I., & Nekhwevha, F. H. (2022). Academic-faculty environment and graduate employability: variation of work-readiness perceptions. *Heliyon*, *8*(3). https://doi.org/10.1016/j.heliyon.2022.e09117

Chowdhury, S. A., Sharmin, R., Amin, A.-, & Shifat, N. (2025). *Integrating an educational supply chain model in the higher education sector : meeting the 21st-century workforce demands in Bangladesh*. *April*, 1–13. https://doi.org/10.3389/feduc.2025.1521309

Clarke, M. (2018). Rethinking graduate employability: the role of capital, individual attributes and context. *Studies in Higher Education*, *43*(11), 1923–1937. https://doi.org/10.1080/03075079.2017.1294152

Cricelli, L., Greco, M., Grimaldi, M., & Llanes Dueñas, L. P. (2018). Intellectual capital and university performance in emerging countries: Evidence from Colombian public universities. *Journal of Intellectual Capital*, *19*(1), 71–95. https://doi.org/10.1108/JIC-02-2017-0037

Damoah, O. B. O., Peprah, A. A., & Brefo, K. O. (2021). Does higher education equip graduate students with the employability skills employers require? The perceptions of employers in Ghana. *Journal of Further and Higher Education*, *45*(10), 1311–1324. https://doi.org/10.1080/0309877X.2020.1860204

David J. Teece. (2023). The Evolution of the Dynamic Capabilities Framework. *Artificiality and Sustainability in Entrepreneurship, FGF Studies in Small Business and Entrepreneurship.*

de Matos Pedro, E., Alves, H., & Leitão, J. (2022). In search of intangible connections: intellectual capital, performance and quality of life in higher education institutions. *Higher Education*, *83*(2), 243–260. https://doi.org/10.1007/s10734-020-00653-9

de Matos Pedro, E., Leitão, J., & Alves, H. (2020). Bridging intellectual capital, sustainable development and quality of life in higher education institutions. *Sustainability (Switzerland)*, *12*(2). https://doi.org/10.3390/su12020479

Dhruba Borah, Khaleel Malik, S. M. (2021). Teaching-focused university–industry collaborations: Determinants and impact on graduates' employability competencies. *Research Policy*, *50*(3). https://doi.org/https://doi.org/10.1016/j.respol.2020.104172

Donald, W. E., Baruch, Y., & Ashleigh, M. J. (2024). Construction and operationalisation of an Employability Capital Growth Model (ECGM) via a systematic literature review (2016–2022). *Studies in Higher Education*, *49*(1), 1–15. https://doi.org/10.1080/03075079.2023.2219270

Edvinsson, L. and Malone, M. S. (1997). *Intellectual Capital: Realizing Your Company's True Value by Finding Its Hidden Brainpower. Harper Business, New York.*

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

Friedrich, R. J. (1982). In Defense of Multiplicative Terms in Multiple Regression Equations. *American Journal of Political Science*, *26*(4), 797. https://doi.org/10.2307/2110973

Fugate, M., Kinicki, A. J., & Ashforth, B. E. (2004). Employability: A psycho-social construct, its dimensions, and applications. *Journal of Vocational Behavior, 65*(1), 14–38.

Habib, M., & Jungthirapanich, C. (2009). Integrated educational management for the Universities. *In The Journal of China-USA Business Review.USA: David Publishing Company. 8*(8), 25–38.

Hair, J., Back, W., Babin, B., and Anderson, R. (2010). *Multivariate data analysis (7th edition). Prentice-Hall, Inc., Upper Saddle River, NJ, USA.*

Hair, J. F., Sarstedt, M., Ringle, C. M., & Hair, J. F. (2019). *Rethinking some of the rethinking of partial least squares Rethinking some of the rethinking of partial least squares*. https://doi.org/10.1108/EJM-10-2018-0665

Hassan, H., Kamaluddin, A., Saad, S., Haron, N. Q. Aini, Hamzah, N., & Kusumaningtias, R. (2022). Intellectual Capital Performance in Higher Education Institutions: Evidence from Public Universities. *International Journal of Academic Research in Business and Social Sciences*, *12*(11), 2176–2191. https://doi.org/10.6007/ijarbss/v12-i11/15305

Hayes, A. F. (2022a). *Introduction to Mediation, Moderation, and Conditional Process Analysis: A Regression-Based Approach*. The Guilford Press.

Hayes, A. F. (2022b). *Introduction to Mediation, Moderation, and Conditional Process Analysis. A Regression-Based Approach* (Third Edition).

Huang, H., Leone, D., Caporuscio, A., & Kraus, S. (2021). Managing intellectual capital in healthcare organizations. A conceptual proposal to promote innovation. *Journal of Intellectual Capital*, *22*(2), 290–310. https://doi.org/10.1108/JIC-02-2020-0063

Ian P. Herbert, Andrew T. Rothwell, Jane L. Glover, S. A. L. (2020). Graduate employability, employment prospects and work-readiness in the changing field of professional work. *The International Journal of Management Education*, *18*(2). https://doi.org/https://doi.org/10.1016/j.ijme.2020.100378

Ibarra-Cisneros, M.A., Reyna, J.B.V. & Hernández-Perlines, F. (2023). Interaction between knowledge management, intellectual capital and innovation in higher education institutions. *Education and Information Technologies*, *28*, 9685–9708. https://doi.org/https://doi.org/10.1007/s10639-022-11563-x

Igwe, P. A., Lock, D., & Rugara, D. G. (2022). What factors determine the development of employability skills in Nigerian higher education? *Innovations in Education and Teaching International*, *59*(3), 337–348. https://doi.org/10.1080/14703297.2020.1850319

Ilhamsyah, I., & Purwanto, S. (2025). *Army Human Resources Development Strategy through Human Capital Approach*. *1*(1).

International Labour Organization. (2024). *World employment and social outlook: Trends 2024. International Labour Organization. Retrieved from https://www.ilo.org/publications/flagship-reports/world-employment-and-social-outlook-trends-2024.*

Jackson, D. (2013). Business graduate employability - where are we going wrong? *Higher Education Research and Development*, *32*(5), 776–790. https://doi.org/10.1080/07294360.2012.709832

Jackson, D. (2014). Self-assessment of employability skill outcomes among undergraduates and alignment with academic ratings. *Assessment and Evaluation in Higher Education*, *39*(1), 53–72. https://doi.org/10.1080/02602938.2013.792107

Jackson, D. (2021). The changing nature of graduate roles and the value of the degree. *Journal of Higher Education Policy and Management*, *43*(2), 182–197. https://doi.org/10.1080/1360080X.2020.1777634

James Robson. (2023). *Assessing the Contributions of Higher Education Knowledge for a Disordered World*. https://doi.org/https://doi.org/10.4337/9781035307173.00019

Jardon, C. M., & Martínez-Cobas, X. (2021). Measuring intellectual capital with financial data. *PLoS ONE*, *16*(5 May), 1–19. https://doi.org/10.1371/journal.pone.0249989

Jessie Koen, Ute-Christine Klehe, Annelies E.M. Van Vianen. (2012). Training career adaptability to facilitate a successful school-to-work transition. *Journal of Vocational Behavior*, *81*(3), 395–408. https://doi.org/https://doi.org/10.1016/j.jvb.2012.10.003.

John Cresswell, J. D. C. (2019). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Thousand Oaks, CA: Sage Publications, Inc. https://doi.org/https://doi.org/10.1002/nha3.20258

Jose, E. P. (2008). *Welcome to the Moderation/Mediation Help Centre, Version 2.0. School of Psychology, Victoria University of Wellington, Wellington.*

Kamukama, N., Ahiauzu, A., & Ntayi, J. M. (2010). Intellectual capital and performance: Testing interaction effects. *Journal of Intellectual Capital*, *11*(4), 554–574. https://doi.org/10.1108/14691931011085687

Kato, S., Galán-muros, V., & Weko, T. (2020). *The emergence of alternative Credentials: OECD Education Working Paper. 216*, 40. https://doi.org/10.1787/b741f39e-en

Kero, C. A., & Bogale, A. T. (2023). A Systematic Review of Resource-Based View and Dynamic Capabilities of Firms and Future Research Avenues. *International Journal of Sustainable Development and Planning*, *18*(10), 3137–3154. https://doi.org/10.18280/ijsdp.181016

Kianto, A., Sáenz, J. and Aramburu, N. (2017). Knowledge-based human resource management practices, intellectual capital and innovation. *Journal of Business Research, 81*, 11–20. https://doi.org/https://doi.org/10.1016/j. jbusr es.2017.07.018.

Kichuk, Y., Kunchenko-Kharchenko, V., & Hrushchynska, N. (2021). *Intellectual Capital of Institutions of Higher Education in the Knowledge Economy*. 159–166. https://doi.org/10.22094/JOIE.2020.677844

Kozlinska, I., Rebmann, A., & Mets, T. (2023). Entrepreneurial competencies and employment status of business graduates : the role of experiential entrepreneurship pedagogy. *Journal of Small Business & Entrepreneurship*, *35*(5), 724–761. https://doi.org/10.1080/08276331.2020.1821159

Kucharska, W. (2022). Tacit knowledge influence on intellectual capital and innovativeness in the healthcare sector: A cross-country study of Poland and the US. *Journal of Business Research*, *149*(May), 869–883. https://doi.org/10.1016/j.jbusres.2022.05.059

Kumaran Rajaram. (2023). Cultural Intelligence in Teaching and Learning. In *Learning Intelligence: Innovative and Digital Transformative Learning Strategies* (pp. 57–118). Springer, Singapore. https://doi.org/https://doi.org/10.1007/978-981-19-9201-8_2

Kusmaryono, I., Wijayanti, D., & Maharani, H. R. (2022). Number of Response Options, Reliability, Validity, and Potential Bias in the Use of the Likert Scale Education and Social Science Research: A Literature Review. *International Journal of Educational Methodology*, *8*(4), 625–637. https://doi.org/10.12973/ijem.8.4.625

Lan, L., & Shabir, M. (2024). *Research progress and prospects on operational excellence of higher education supply chain in the post-pandemic era*. *16*(4), 1515–1531.

Leisa Hassock & Christopher Hill. (2022). Employability and Employment: The Role of Higher Education in a Rapidly Changing World. In *Higher Education and Job Employability* (10th ed., pp. 155–178). Springer, Cham.

Lindberg, M. E. (2007). At the Frontier of Graduate Surveys. *Higher Education*, *53*, 623–644. https://doi.org/https://doi.org/10.1007/s10734-005-1672-4

Lynn, M. R. (1986). Determination and quantification of content validity. *Nursing Research*, *35*(6), 382–385. https://doi.org/https://doi.org/10.1097/00006199-198611000-00017

Ma'dan, M., Ismail, M. T., & Daud, S. (2020). Strategies to enhance graduate employability: Insights from Malaysian public university policy-makers. *Malaysian Journal of Learning and Instruction*, *17*(2), 137–165. https://doi.org/10.32890/mjli2020.17.2.5

Maqsood Ahmad, Qiang Wu, M. Sualeh K. (2022). Intellectual Capital, Corporate Social Responsibility, and Sustainable Competitive Performance of Small and Medium-Sized Enterprises: Mediating Effects of Organizational Innovation. *Kybernetes*. https://doi.org/10.1108/K-02-2022-0234

Mastercard Foundation. (2025). *Young Africa Works - Uganda :*

Masuwai, A., Zulkifli, H., & Hamzah, M. I. (2024). Evaluation of content validity and face validity of the secondary school Islamic education teacher self- assessment instrument. *Cogent Education*, *11*(1). https://doi.org/10.1080/2331186X.2024.2308410

McClelland, G. H. (1993). Statistical difficulties of detecting interactions and moderator effects. *Psychol Bull.*, *14*(2), 376-90. https://doi.org/doi: 10.1037/0033-2909.114.2.376. PMID: 8416037.

Memon, M. A., Thurasamy, R., Ting, H., & Cheah, J. H. (2025). Purposive Sampling: A Review and Guidelines for Quantitative Research. *Journal of Applied Structural Equation Modeling*, *9*(1), 1–23. https://doi.org/10.47263/JASEM.9(1)01

Mgaiwa, S. J. (2021). Fostering Graduate Employability: Rethinking Tanzania's University Practices. *SAGE Open*, *11*(2). https://doi.org/10.1177/21582440211006709

Mohammad Fawzi Shubita. (2023). *The effect of human capital and structural capital on leverage : Evidence from Jordan*. 0–10. https://doi.org/10.21511/ppm.21(3).2023.01

Mukaro, C. T., Deka, A., & Rukani, S. (2023). The influence of intellectual capital on organizational performance. *Future Business Journal*, *9*(1), 1–14. https://doi.org/10.1186/s43093-023-00208-1

Muna, A., Ausat, A., Bana, T. Al, & Gadzali, S. S. (2023). *Basic Capital of Creative Economy : The Role of Intellectual, Social, Cultural, and Institutional Capital*. *1*(2), 42–54.

Ng, P. M. L., Chan, J. K. Y., Wut, T. M., Lo, M. F., & Szeto, I. (2021). What makes better career opportunities for young graduates? Examining acquired employability skills in higher education institutions. *Education*

+ Training, *63*(6), 852–871. https://doi.org/10.1108/ET-08-2020-0231

Nwajiuba, C. A., Igwe, P. A., Akinsola-Obatolu, A. D., Ituma, A., & Binuomote, M. O. (2020). What can be done to improve higher education quality and graduate employability in Nigeria? A stakeholder approach. *Industry and Higher Education*, *34*(5), 358–367. https://doi.org/10.1177/0950422219901102

OECD. (2022). *OECD Labour Force Statistics 2021, OECD Publishing, Paris*. https://doi.org/https://doi.org/10.1787/177e93b9-en.

Okolie, U. C., Igwe, P. A., Nwosu, H. E., Eneje, B. C., & Mlanga, S. (2020). Enhancing graduate employability: Why do higher education institutions have problems with teaching generic skills? *Policy Futures in Education*, *18*(2), 294–313. https://doi.org/10.1177/1478210319864824

Oliveira, M., Curado, C., Balle, A. R., & Kianto, A. (2020). Knowledge sharing, intellectual capital, and organizational results in SMES: are they related? *Journal of Intellectual Capital*, *21*(6), 893–911. https://doi.org/10.1108/JIC-04-2019-0077

Otermans, P., Small, S., Pereira, M., & Sridharan, P. (2025). Students ' and graduates ' perspectives on skill development in higher education. *Journal of Education and Work*, *00*(00), 1–29. https://doi.org/10.1080/13639080.2025.2576858

Pahwa, M., Cavanagh, A., & Vanstone, M. (2023). Key Informants in Applied Qualitative Health Research. *Qualitative Health Research*, *33*(14), 1251–1261. https://doi.org/10.1177/10497323231198796

Päivi Siivonen, Ulpukka Isopahkala-Bouret, Michael Tomlinson, M. K. & N. H. (2023). Rethinking Graduate Employability in Context. In *Rethinking Graduate Employability in Context*. https://doi.org/10.1007/978-3-031-20653-5

Petty, R., & Guthrie, J. (2000). Intellectual capital literature review 155 Intellectual capital literature review Measurement, reporting and management. In *Journal of Intellectual Capital* (Vol. 1, Issue 2). # MCB University Press. http://www.emerald-library.com

Pitan, O. S., & Muller, C. (2019). University reputation and undergraduates' self-perceived employability: mediating influence of experiential learning activities. *Higher Education Research and Development*, *38*(6), 1269–1284. https://doi.org/10.1080/07294360.2019.1634678

Podsakoff, P. M., MacKenzie, S. B., and Podsakoff, N. P. (2012). *Sources of Method Bias in Social Science Research and Recommendations on How to Control It. Annual Review of Psychology,63(1), 539-569. DOI: DOI:10.1146/annurev-psych-120710-100452*.

Podsakoff, P.M., Mackenzie, S.B. and Lee, J. Y. (2003). Common Method Bias in Behavioral Research: A Review of Literature and Recommended Remedies. *Journal of Psychology*, *88*(5), 879-903.

Priti Sharma. (2021). A Perceptual Study on the Causal Relationship Between Human Capital and Organizational Performance of Small and Medium Enterprises. *International Journal of Entrepreneurship and Governance in Cognitive Cities*, *2*(2).

Ramírez, Y., & Gordillo, S. (2014). Recognition and measurement of intellectual capital in Spanish universities. *Journal of Intellectual Capital*, *15*(1), 173–188. https://doi.org/10.1108/JIC-05-2013-0058

Rampa, R., & Agogué, M. (2021). Developing radical innovation capabilities: Exploring the effects of training employees for creativity and innovation. *Creativity and Innovation Management*, *30*(1), 211–227. https://doi.org/10.1111/caim.12423

Rex B. Kline. (2023). *Principles and Practice of Structural Equation Modeling* (Fifth Edit).

Romano M, Cunningham JA, Cuttone G, Munnia A, N. M. (2025). "Intellectual capital-based research impact management: a strategic approach to increase regional intellectual capital." *Journal of Intellectual Capital*, *26*(7), 24–42. https://doi.org/https://doi.org/10.1108/JIC-04-2024-0115

Römgens, I., Scoupe, R., & Beausaert, S. (2020). Unraveling the concept of employability, bringing together research on employability in higher education and the workplace. *Studies in Higher Education*, *45*(12), 2588–2603. https://doi.org/10.1080/03075079.2019.1623770

Roshchin, S., & Rudakov, V. (2015). *Do Graduates' Wages Measure the Quality of Education ? A Review of Existing Studies*.

Salinas-Ávila, J., Abreu-Ledón, R., & Tamayo-Arias, J. (2020). Intellectual capital and knowledge generation: an empirical study from Colombian public universities. *Journal of Intellectual Capital*, *21*(6), 1053–1084. https://doi.org/10.1108/JIC-09-2019-0223

Saunders, M.N.K., Lewis, P. and Thornhill, A. (2019). *Research methods for business students* (Eighth edition). London: Pearson.

Savickas, M.L. and Porfeli, E. J. (2012). Career Adapt-Abilities Scale: Construction, Reliability and Measurement Equivalence across 13 Countries. *Journal of Vocational Behaviour, 80*, 661–673.

https://doi.org/http://dx.doi.org/10.1016/j.jvb.2012.01.012

Serenko, A., Abubakar, A. M., & Bontis, N. (2024). Understanding the drivers of organizational business performance from the human capital perspective. *Knowledge and Process Management*, *31*(1), 48–59. https://doi.org/10.1002/kpm.1763

Sharon L. Lohr. (2022). *Sampling: Design and Analysis* (Third Edition). CRC Press. https://doi.org/10.1201/9780429296284

Shiyuan, Y., Guorong, H., & Juan, C. (2022). *Impact of human capital and social capital on employability of Chinese college students under the COVID-19 epidemic — Joint moderating effects of perception reduction of employment opportunities and future career clarity*. *December*. https://doi.org/10.3389/fpsyg.2022.1046952

Siegel, D. S., & Leih, S. (2018). Strategic management theory and universities: An overview of the special issue. doi:10.1177/1476127017733141. *Strategic Organization*, *16*(1), 6–11.

Sophia, G., & Onen, D. (2024). *East African Journal of Education Studies Curriculum Alignment and Graduate Employability : A Comprehensive Exploration at Makerere University*. *7*(4), 712–727. https://doi.org/10.37284/eajes.7.4.2464

Steven Mintz. (2024). *The Learning-Centered University: Making College a More Developmental, Transformational, and Equitable Experience*. JHU Press.

Strazzullo, S., Cricelli, L., & Grimaldi, M. (2022). Intellectual capital and R&D performance improvement: the case of Italian public universities. *R and D Management*. https://doi.org/10.1111/radm.12548

Stronati, C. (2023). *The design of upper secondary education across OECD countries : Managing choice, coherence and specialisation*. *288*, 0–98.

Sultanova, G., Svyatov, S., & Ussenbayev, N. (2018). Transmitting competencies at universities in Kazakhstan: intellectual capital of teachers. *Journal of Intellectual Capital*, *19*(1), 112–134. https://doi.org/10.1108/JIC-04-2017-0058

Sutrisno, E. R., Kindangen, P., Sendow, G. M., Bin, A., & Jan, H. (2024). *IMPACT OF HUMAN CAPITAL AND STRUCTURAL CAPITAL ON COMPETITIVE ADVANTAGE : EVIDENCE FROM INDONESIAN PROVINCIAL GOVERNMENT INSTITUTIONS*. 1–29.

Sveiby, K. E. (2001). A knowledge-based theory of the firm to guide strategy formulation. *Journal of Intellectual Capital*, *2*(4), 344–358.

Tabachnick, B. G., & Fidell, L. S. (2019). *Using Multivariate Statistics* (7th Edition). Pearson.

Teece, D. J. (2016). Dynamic capabilities and entrepreneurial management in large organizations: Toward a theory of the (entrepreneurial) firm. *European Economic Review*, *86*, 202–216. https://doi.org/10.1016/j.euroecorev.2015.11.006

Teece, D. J. (2026). *Dynamic Capabilities and Related Paradigms* (Vol. 0693).

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic Capabilities and Strategic Management. In *Management Journal* (Vol. 18, Issue 7).

Theodore W. Schultz. (1972). The Increasing Economic Value of Human Time. *American Journal of Agricultural Economics*, *54*(5), 843–850. https://doi.org/https://doi.org/10.2307/1239227

Tholen, G. (2020). Degree power: educational credentialism within three skilled occupations. *British Journal of Sociology of Education*, *41*(3), 283–298. https://doi.org/10.1080/01425692.2019.1690427

Tholen, U. I.-B. and G. (2023). Relative Employability: Applying the Insights of Positional Competition and Conflict Theories Within the Current Higher Education Landscape. In *Rethinking Graduate Employability in Context, https://doi.org/10.1007/978-3-031-20653-5_3* (pp. 51–72).

Tomlinson, M. (2017a). Forms of graduate capital and their relationship to graduate employability. *Education and Training*, *59*(4), 338–352. https://doi.org/10.1108/ET-05-2016-0090

Tomlinson, M. (2017b). Introduction: Graduate Employability in Context: Charting a Complex, Contested and Multi-Faceted Policy and Research Field. In *Graduate Employability in Context* (pp. 1–40). Palgrave Macmillan UK. https://doi.org/10.1057/978-1-137-57168-7_1

UBOS. (2023). *UGANDA BUREAU OF STATISTICS. STATISTICAL ABSTRACT*.

Vélez-rolón, A. M., López, A. P., Méndez-pinzón, M., & Neira-Bermúdez, D. (2021). *Closing the academy – Business gap by building intellectual capital in professional formation*.

Wahyudi, T., Arisondha, E., Nofianti, N., Widyaningsih, I. U., & Ageng, U. S. (2025). *Exploring The Evolution and Impact of Intellectual Capital on Organizational Performance: 3*(April), 14–34.

Wang, Z., Cai, S., Liang, H., Wang, N., & Xiang, E. (2021). Intellectual capital and firm performance: the mediating role of innovation speed and quality. *International Journal of Human Resource Management*, *32*(6),

1222–1250. https://doi.org/10.1080/09585192.2018.1511611

Wernerfelt, B. (1984). *A Resource-Based View of the Firm Author (s).*

Wondwosen Tamrat. (2022). Graduate Employability and Responsiveness: The Need for Aligning Policy Directions and Institutional Readiness in Ethiopia. In *Graduate Employability Across Contexts.* (pp. 147–166). https://doi.org/10.1007/978-981-19-3959-4_8

Wright, E., & Wei, H. (2022). The changing value of higher education as a currency of opportunity. *Asian Education and Development Studies*, *11*(1), 42–54. https://doi.org/10.1108/AEDS-08-2019-0120

Yamen T. (1973). *Statistics: An Introductory Analysis, 3rd Edition, Harper and Row, New York, NY*.

Yazdani, S., Majidi, F., Bayazidi, S., & Dehnavi, H. (2022). Entrepreneurial Universities: The Role of Knowledge Service Innovation. *Acta Medica Iranica*, *60*(8), 479–491. https://doi.org/10.18502/acta.v60i8.10832

Zheng, G., Haq, M. Z. U., Huo, B., Zhang, Y., & Yue, X. (2024). Leveraging intellectual capital for building a supply chain circular economy system: A knowledge-based view. *International Journal of Production Economics*, *272*(109225).