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The role of Human Capital in the Relationship Between Social Interaction and Knowledge-Worker Productivity

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Abstract

Globally, knowledge-based businesses are expanding, which has increased the demand for knowledge workers. However, as labor demand shifts gradually from manual workers to knowledge workers, organizations are struggling to design alternative mechanisms to cope with this structural shift, which negatively impacts knowledge-worker productivity. This study sought to examine whether social interaction influences knowledge-worker productivity through human capital. A cross-sectional design was used, employing a quantitative study approach. Data from 225 Ugandan ICT professionals was collected and analyzed using structural equation modeling. Results showed that human capital plays a partial mediation role in the relationship between social interaction and knowledge worker productivity, with an effect size of 0.11 and a P-value of 0.005. While control variables of gender and age were insignificant, education was significant in explaining variations in knowledge-worker productivity. These findings are significant because they have shown that when ICT firms foster a collaborative environment while leveraging workplace learning, knowledge workers become productive. This study provides a comprehensive understanding of how knowledge workers can acquire knowledge and skills situated within social networks, thereby enhancing their productive capacity.

Keywords: Social Interaction, Human capital, Knowledge workers, Knowledge-worker productivity

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Introduction

Worldwide, as the knowledge-based economy continues to expand, managers have turned to raising the productivity of knowledge workers as an alternative avenue in driving the growth of businesses (Sahibzada et al., 2022; Shujahat et al., 2019). Traditionally, organizations have been relying on manual workers whose capacity to raise the quantity of output lies in their physical energy (Firdaus et al., 2024; Tapasco-Alzate et al., 2022). However, over time, physical work has gradually been diminishing and it is being replaced with knowledge work where knowledge and skills have turned out to be critical not only in raising quantity but also the quality of output (Moussa et al., 2017; Sahibzada et al., 2022). This has placed knowledge workers as a critical factor whose services will play a significant role in the growth of business enterprises (Palvalin et al., 2017; Shujahat et al., 2021). Whereas organizations have heavily relied on evaluating employee competencies based on college education, knowledge and skills relevant to market trends have been changing, which has become a challenge in promoting knowledge-worker productivity (Firdaus et al., 2024). Knowledge-worker productivity relates to knowledge-worker effectiveness and efficiency in the production of knowledge-based outputs. Butt et al. (2019) and Moussa et al. (2017) have defined knowledge workers as a labour force that acquires, shares, generates, and utilizes knowledge to deliver services to clients.

As mechanisms to enrich knowledge-worker productivity continue to emerge, organizations can adopt the African culture of Ubuntu, which emphasizes the spirit of shared humanity (Udah et al., 2025). This promotes collective action in the workplace, which is a foundation for sharing knowledge and ideas on how to enrich knowledge-worker productivity. Ubuntu challenges the Western culture of individual-centric tendencies, which may lead to knowledge hiding and eventually impact negatively on labour productivity (Tayali, 2025). Previous research has shown that a network of social ties can provide opportunities for knowledge sharing, skills spillover, and knowledge diffusion (Fernandes et al., 2019; Óskarsdóttir et al., 2022). This raises the capacity of knowledge workers to allocate and utilize resources efficiently (Óskarsdóttir et al., 2022). While education is fundamental for employees, as clients' tastes and preferences change, it may demand that knowledge workers participate in continuous acquisition of new knowledge and skills since what is acquired from college may not be sufficient and relevant to emerging challenges (Ray et al., 2023; Rozkwitalska, 2019).

The current study is built on existing gaps in empirical literature, which are as follows: First, until the current study, empirical literature hadn't paid attention to examining whether human capital has an indirect effect in the relationship between social interaction and knowledge-worker productivity. Secondly, since the knowledge-based sector is still emerging globally, the empirical literature on workers' productivity has concentrated more on the manufacturing and agricultural sectors, which are dominated by manual workers. Such results may not be replicable in the context of knowledge workers. Thirdly, most studies on knowledge-worker productivity have been carried out in Europe and Asia (Butt et al., 2019; Khaksar et al., 2020; Kianto et al., 2019; Palvalin et al., 2017) with little attention given to the African context. The current study is founded on the existing knowledge gap and is guided by the

following research questions. Firstly, does social interaction influence human capital and knowledge-worker productivity? Secondly, does human capital explain variations in knowledge-worker productivity? Thirdly, does human capital mediate the relationship between social interaction and knowledge-worker productivity? The rest of the article explains the theoretical foundation, literature review, findings, and implications.

Theoretical Foundation.

A multi-theoretical approach that combines Cultural Historical Activity Theory (CHAT) and Human Capital Theory was used to guide the study. Cultural Historical Activity Theory, proposed by Engestrom (1987), observes that human activities are context-specific, defined by the environment in which they are carried out. According to Batiibwe (2019), human consciousness and a person's views develop and are shaped by the social environment. This, in turn, controls and shapes activity outcome (Burkitt, 2021). Besides, CHAT explains that knowledge and skills are not static but rather evolving as new ideas develop from the continued collective actions carried out within an organization (Batiibwe, 2019; Engeström and Sannino, 2010). Amidst the collective actions, varied opinions and suggestions emerge, producing contradictions and disagreements within the organization. Contradictions and disagreements are grounds for reinventing knowledge, ideas, and skills relevant to changing demands (Engeström and Sannino, 2010). Knowledge and skills reinvented will eventually be adopted by organizational workers, which will build the capacity to deliver quality services while minimizing costs.

Human capital theory, advanced by Becker (1964), comprises intangible resources that include cognitive abilities, skills, and knowledge that a person may possess. Human capital enriches labor productivity through the diffusion, allocative, worker, and research effects (Peers, 2015). Through allocative effect, workers will use their knowledge and skills to allocate resources cost-effectively (Akhvlediani and Cieślik, 2020). Peers (2015) explained that when employees possess relevant skills, experience, and knowledge, they will use their competencies effectively to enrich the achievement of the organization's goals. Through the diffusion effect, Akhvlediani and Cieślik (2020) explained that workers endowed with relevant skills and knowledge will adjust easily to changes effected within the workplace environment. Moreover, relevant skills and knowledge empower workers with the capacity to quickly learn new methods that may be introduced within the organization. Under the theory, research effect captures the capacity of workers to use their skills and knowledge to research and learn how to improve the services delivered (Becker, 1964; Peerr, 2015). Based on the human capital theory, the study reasons that when knowledge workers acquire, develop, share, and utilize new skills learned and knowledge acquired, they can easily produce goods and services efficiently and effectively.

Social Interaction and Human Capital

Social interaction relates to people working as a collective with mutual orientation to influence each other's actions (Bueno et al., 2018; Rozkwitalska, 2019). Social interaction is represented by the constructs of communication, coordination, and mutual support. Communication depicts the exchange of information between two or more people (Gallotti et al., 2017; Hsiao et al., 2011; Lechler, 2001). Information sharing thrives on constant communication, which is a platform for learning new skills from peers and spreading knowledge (Ray et al., 2023). Coordination relates to organizing departments and workers to work together (Hernaus et al., 2021). This provides a platform for knowledge workers in different work units and on different tasks to share experiences, which is a foundation for knowledge spillover (Han et al., 2018; Nguyen et al., 2018). Moreover, Akinyemi et al. (2019) and Nansubuga et al. (2019) explained that to build knowledge contextual to the business, workers should participate in creating communities of practice. This will offer a platform where employees reciprocally support each other in acquiring, creating, and reflecting on knowledge and skills contextual to the organization. Deepa et al. (2023) and Yang (2024) have observed that the post-COVID era has witnessed the continued preference among workers to opt for remote working, which reduces opportunities that emerge from spontaneous relationship-oriented communication. Physical interactive encounters are critical for building an environment that fosters collective observational learning (Chatterjee, 2025; Przybyłek et al., 2025). However, Powers et al. (2023) have argued that constant switching between work and spontaneous conversations leads to mental fatigue. This may prevent workers from learning and comprehending the knowledge that has been shared (Powers et al., 2023). Tubiana et al. (2022) have argued that workers who possess knowledge and skills in using technology are socially interactive. The current study hypothesizes that:

H1: *There is a significant relationship between social interaction and human capital*

Social Interaction and Knowledge-worker Productivity

Social interaction enables knowledge-worker productivity through communication, coordination, and mutual support (Gallotti et al., 2017; Huang and Li, 2009; Nguyen et al., 2018; Tubiana et al., 2022). When channels of communication are created, they act as a foundation through which a group of employees can share information aimed at providing solutions to minimize errors and mistakes (Tubiana et al., 2022; Udah et al., 2025). This improves the quality of services rendered to

clients (Gallotti et al., 2017; Tubiana et al., 2022). Coordination acts as a foundation for developing a value chain that fosters the smooth transmission of services from one work unit to another (Hernaus et al., 2021). This minimizes breaks, redundancy, and cost in the delivery of services (Hernaus et al., 2021; Lechler, 2001). Coordination allows knowledge workers to practice division of labour by distributing tasks among various work groups. This enables tasks to be completed on time, which minimizes resource utilization (Nguyen et al., 2018). Udah et al. (2025) have highlighted that to boost collectivism, organizations from the African context have started to promote the spirit of shared humanity, which manifests through the Ubuntu culture. Ubuntu culture creates an environment where people are reciprocally supportive in achieving a shared goal (Tayali, 2025). In such an environment, employees will try to make an effort to engage in constructive discussions directed towards providing solutions on how to deliver quality services efficiently. However, studies like that of Deepa et al. (2023) have observed that social interactions, which manifest in the form of spontaneous conversations, may result in information overload, affecting the stimuli and ability of workers to process complex information. The current study hypothesizes that:

H2: *There is a significant relationship between social interaction and knowledge-worker productivity*

Human Capital and Knowledge-worker Productivity

Skills and knowledge have been identified as alternative inputs that knowledge workers can use to enrich their productive capacity (Kianto et al., 2019). Sahibzada et al. (2022) have observed that knowledge worker tasks are highly knowledge-based, which explains the relevance of knowledge acquisition and utilization as an essential input that fosters the delivery of quality services. Knowledge workers who continuously acquire and produce knowledge tend to respond quickly with innovative solutions to client problems. This raises the quality of services and revenue generated from services rendered to clients (Jibir et al., 2023; Shujahat et al., 2019). Ali Ababneh (2022) explained that while knowledge is a fundamental input in raising workers' productivity, skills have increasingly turned out to be equally important. This is true especially with the changing working environment and the advancement in technology. Workers can competently adjust to changes effected within the work environment if they possess relevant skills, which raises the speed at which tasks are carried out (Kengatharan, 2019; Sansone et al., 2020). This reduces resource wastage and improves the quality of products (Kengatharan, 2019; Sansone et al., 2020). However, Zhang et al. (2024) have argued that human capital may signal the potential to be productive without causing it. This manifests when employees who possess knowledge and skills deliberately refuse to apply them to the tasks assigned (Zhang et al., 2024). The current study hypothesizes that:

H3: *A significant relationship exists between human capital and knowledge-worker productivity*

Mediating Role of Human Capital on the Relationship Between Social Interactions and Knowledge-worker Productivity

Collective sharing of experiences thrives on social interaction, which is a foundation for peer learning, exposure to new skills, and knowledge spillover (Ray et al., 2023; Rozkwitalska, 2019; Zaman et al, 2019). While knowledge workers can acquire skills and knowledge from school, Ray et al. (2023) observed that these resources can also be acquired from within the workplace through peer-to-peer interactive learning. According to Crook et al. (2011), knowledge and skills that are unique to an organization are impactful in raising worker productivity. When employees work together, they can reflect, experiment, and adjust to new knowledge acquired from the work environment (Tayali, 2025). Working as a team exposes knowledge workers to diverse practices and perspectives, which is a foundation for multi-skilled development **(**Fernandes et al., 2019; Óskarsdóttir et al., 2022; Tariq et al., 2024). Through team problem-solving and collaborative discussions, workers have access to tacit knowledge, which may be more impactful than college training (Tayali, 2025; Thalmann et al., 2025; Ziervogel et al., 2022). Moreover, social interaction in the workplace environment can offer a platform for unlearning and relearning new skills (Hsiao et al., 2011; Rasipuram and Jayagopi, 2020; Ray et al., 2023; Sansone et al., 2020). Eventually, will build a foundation for making quality decisions on how to allocate and utilize resources efficiently (Kianto et al., 2019; Sansone et al., 2020). The current study hypothesizes that:

H4: Human capital significantly mediates the relationship between social interaction and knowledge-worker productivity

Research methods

Research Design and Target Population

This study used a quantitative cross-sectional design. The population comprised ICT professionals in Ugandan companies. They were selected because Uganda, through the National Planning Authority (NPA), aims to build a knowledge-intensive economy by 2040, with ICT as its foundation (MoICT, 2014). As the global economy shifts toward knowledge-based systems, ICT professionals are key to

Uganda's growth (NPA, 2013). Prior studies (Butt et al., 2019; Hartal et al., 2023; Kianto et al., 2019) also identify ICT workers as knowledge workers. The sampling frame was derived from the Information and Communication Technology Association of Uganda (ICTAU), which has 1,472 members. Using simple random sampling and Yamen's (1963) formula, the sample size was 314. Power analysis using Daniel Soper's calculator, following Hair et al. (2010), Kline (2023), and Soper (2022), with effect size = 0.3, power = 0.8, three latent and 32 observed variables, and p = 0.05, indicated a minimum sample of 199, below the 225 valid responses used. Content validity was confirmed by 5 practitioners and 4 experts, with an index above 0.7 (Field, 2009). A pilot test with 30 respondents refined items, and reliability was confirmed, with Cronbach's alpha above 0.7 for all variables.

Measures

Knowledge-worker productivity was measured based on two constructs, which included task effectiveness and task efficiency (Butt et al., 2019; Khaksar et al., 2020; Kianto et al., 2019; Tapasco-Alzate et al., 2022). Task effectiveness captures the quality of services delivered, achievement of task goals, and enrichment of customer satisfaction. On the other hand, task efficiency captures cost minimization, minimizing resource use, and timeliness (Butt et al., 2019; Khaksar et al., 2020; Kianto et al., 2019; Ramírez and Nembhard, 2004). The measurement scale was adapted from prior studies (Bueno et al., 2018; Hoegl et al., 2003; Khaksar et al., 2020; Palvalin et al., 2017). Social interaction was constructed based on coordination, mutual support, and communication (Huang and Li, 2009; Lechler, 2001). The measurement scale was adapted based on previous studies (Huang and Li, 2009; Lechler, 2001).Two dimensions of knowledge and skills were used to measure human capital (Dar and Mishra, 2021; Vidotto et al., 2017). The measurement scale was adapted based on previous studies (Lee et al., 2013; Kim et al., 2011; Seleim and Khalil, 2011). All items were designed based on a 6-point Likert scale.Control Variables (Age, gender, and education) were controlled for as guided by Khaksar et al. (2020) and Shujahat et al. (2021).

Results

Characteristics of respondents

The questionnaire tool was distributed to 314 respondents, and 263(83.7%) were returned. 38 questionnaires were dropped as recommended by Hair et al. (2015) and Pituch and Stevens (2015) because more than 50% of the questionnaire items had not been responded to. Hair et al. (2015) explained that such items need to be discarded because they may invalidate study findings. Therefore, the valid questionnaires for this study were 225, and as indicated in Table I, 99 (44.0%) were female, while 126 (56.0%) represented male respondents.

Table I: Respondent Features

Features	F	%
Gender.		
Male.	126	56
Female.	99	44
Respondent Age.		
16.-25.	11	4.8
26.-35.	81	36.1
36.-45.	87	38.6
46.-55.	36	16.1
56.-65.	10	4.4
65.-Above.	0	0
Education Level.		
Bachelor Degree.	94	41.6
Master Degree.	129	57.6
PhD.	2	0.8
Experience.		
1.-5.	64	15.5
6.-.10	139	63.3
11.-Above.	22	21.2

Source(s): primary data

The majority of the respondents, 179 (79.6%), were below the age of 46 years, which is due to the sector of ICT being a field that is new and dominated by a young generation. All respondents had at least a bachelor's degree, which is in line with the suggestion of Shujahat et al. (2021), who observed that knowledge workers need to acquire technical knowledge in a field of specialization. All respondents had attained experience of at least 1 year working in the IT sector. 167 (74.2%) of the respondents were employed in organizations, while 58 (25.8%) of the respondents opened up their own companies to become self-employed. This implies that all respondents were actively engaged in acquiring and utilizing ICT knowledge to deliver services.

Assessment of measurement models

Missing value analysis showed less than 5% missing data, which were replaced using linear interpolation (Field, 2009). Procedural and statistical remedies were applied to control common method bias. Procedurally, items were clearly worded, sourced from different studies, and used varied response formats. Statistically, Harman's single-factor test confirmed no common method bias, as no single factor explained over 50% of the variance (Field, 2009). Reliability was assessed using Cronbach's alpha and composite reliability, all above the 0.7 threshold. EFA results indicated convergent and discriminant validity. Data were then analyzed in AMOS for CFA. According to Kline (2023), model fit was confirmed with TLI, CFI, and IFI ≥ 0.95; AGFI and GFI ≥ 0.9; and RMSEA < 0.08. CFA results (see Appendix, Table II; Figures 3–5) showed all constructs for knowledge-worker productivity, social interaction, and human capital were retained. Table III confirmed discriminant validity using Fornell and Larcker's (1981) criterion, as the square root of AVE values exceeded inter-variable correlations.

Table III: Results for discriminant validity

Social Interaction (SOI), Human Capital (HCP), Knowledge-worker productivity (KWP), Gender (GD),

Variable	Mean	SD	AVE	1	2	3	4	5	6
SOI	4.00	.65	0.67	**.81**					
HCP	4.14	.76	0.71	.42**	**.80**				
KWP	4.04	.72	0.62	.41**	.49**	**.78**			
AG	2.79	.84	N/A	-.14	-.15	-.17	**N/A**		
GD	0.44	.49	N/A	-.02	-.07	-.09	-.01	**N/A**	
ED	1.30	.47	N/A	.06	.08	.30**	-.01	**-.03**	**N/A**

**. Correlation is significant at the 0.01 level (2-tailed).

Age (AG), Education (ED)

Structural equation model assessment

Latent structural equation modelling was used to examine relationships among variables. Collier (2020) suggested comparing competing models based on fit indices. A fitting model should have CFI, IFI, and TLI above 0.95; AGFI and GFI above 0.9; RMSEA below 0.08; and factor loadings above 0.5 and significant (Hair et al., 2017). Guided by these indices, models in Figure 1 (Model I) and Figure 2 (Model II) were compared, with results in Table IV.

Table 1V: Structural Equation Model fit results for the competing models

Variable	RMSEA	Df	P	$\frac{\chi 2}{df}$	IFI	GFI	AGFI	CFI	TLI	$\chi 2$
Threshold	**≤.08**		**≥.05**	**1≤a≤3**	**≥.95**	**≥.90**	**≥.90**	**≥.95**	**≥.95**	
Model I	**0.025**	**101**	**.158**	**1.141**	**.989**	**.940**	**.919**	**.989**	**.987**	**115.21**
Model II	**0.040**	**102**	**.008**	**1.369**	**.971**	**.927**	**.903**	**.971**	**.966**	**139.44**

The mediated model posted CFI = 0.989, while the unmediated model had CFI = 0.971, indicating the mediated model had a better fit. It also showed lower RMSEA (0.025) than the unmediated model (0.04), thus adopted for the study. Sensitivity analysis assessed model robustness by re-estimating after removing outliers. RMSEA slightly decreased from 0.034 to 0.025, and CFI increased from 0.962 to 0.989, confirming the model's stability.

Hypothesis Testing

As recommended by Collier (2020), we utilized the method of bootstrap with a Bias-corrected Confidence Interval (BCI) of 95% to test the hypotheses and effects of control variables. According to Collier (2020), a hypothesis will be considered statistically supported when the corresponding probability value is below 5% (0.05), and there shouldn't be a zero within the lower and upper confidence bounds of BCI. Collier (2020) further suggests that values of the Critical Ratio (C.R.) need to be above 1.96. Figure 1 (see Appendix) and Table V results show that there is a positive and significant relationship between social interaction and human capital since β = 0.363, P = 0.006, C.R. is 4.303, with the lower and upper boundary values of BCI not containing a zero. Results also show that there is a positive and significant relationship between social interaction and knowledge-worker productivity since β = 0.360, P = 0.005, C.R. is 3.867, with the lower and upper boundary values of BCI not containing a zero.

Table V: Hypothesis tests

Standardized Direct Effects	β	C.R.	P. Values (BCI)	BCI	
HCP. <---SOI.	0.363	4.303	0.006	0.193-0.517	Supported
KWP. <---SOI.	0.360	3.867	0.005	0.237-0.533	Supported
KWP. <---HCP.	0.294	3.680	0.019	0.133-0.409	Supported
Standardized Indirect Effects					
KWP. <---HCP. <---SOI.	0.110		0.005	0.049-0.196	Supported
Control Variables					
KWP. <---AG	-0.015	-0.253	0.789	-0.183-0.132	Not Supported
KWP. <---GD	-0.067	-1.093	0.215	-0.207-0.044	Not Supported
KWP. <---ED	0.269	3.908	0.007	0.151-0.385	Supported

β- Standardized regression weights**,** Social Interaction (SOI.), Human Capital (HCP.), Knowledge-worker productivity (KWP), Age (AG), Gender (GD), Education (ED)

Results further show that there is a positive and significant relationship between human capital and knowledge-worker productivity since β = 0.294, P = 0.019, C.R. is 3.680, with the lower and upper boundary values of BCI not containing a zero. Results of Table V show that there is a positive and significant mediating effect of human capital on the relationship between social interaction and knowledge-worker productivity, since β = 0.110, P = 0.005, with the BCI values for the lower and upper boundary not containing a zero. Results in Table V show that age is insignificant in explaining variations in knowledge-worker productivity since β = -0.015, P=-0.789, C.R. is -0.253 with the lower and upper boundary values of BCI containing a zero. Results in Table V show that gender is insignificant in explaining variations in knowledge-worker productivity since β = -0.067, P = 0.215, C.R. is -1.093 with the lower and upper boundary values of BCI containing a zero. Results in Table V show that education is significant in explaining variations in knowledge-worker productivity since β = 0.269, P = 0.007, C.R. is 3.908, with the lower and upper boundary values of BCI not containing a zero. The results of the hypothesis tests are captured in Figure I and Table V.

Discussion of Findings

Social Interaction and Human Capital

The findings of the study supported hypothesis one (H_1), indicating that a positive and significant relationship exists between social interaction and human capital. This suggests that when knowledge workers are reciprocally supportive of each other, they can easily share knowledge among themselves and collectively learn new skills through sharing experiences. This has been supported by Akinyemi et al. (2019), who highlighted that when workers jointly support each other, they can work together while sharing knowledge, skills, and ideas relevant to the daily assigned tasks in which they are engaged. Furthermore, when knowledge workers institute effective channels of communication, information can easily flow from one person to another. Sharing information offers a platform through which knowledge can be shared. This is in line with the observations made by Nansubuga et al. (2019) and Ray et al. (2023), who explained that reflections, views, skills, and knowledge are developed and shaped not only by the activity one engages in but also by the ideas communicated by individual workers within the community. Results have also shown that when tasks are coordinated, it creates an opportunity for exposure to different ideas, skills, and knowledge. This is in agreement with the observations made by Han et al. (2018) and Nguyen et al. (2018), who observed that activity coordination provides a foundation for employees working on different projects to share experiences. This fosters knowledge spillover and access to learning new skills.

Social Interaction and Knowledge-Worker Productivity

The findings of the study supported hypothesis two (H_2), which implies that a significant and positive relationship exists between social interaction and knowledge-worker productivity. To compare effect sizes, the standardized beta coefficient in the current study was 0.360, whereas a prior study by Tubiana et al. (2022) reported a smaller effect with β = 0.0537. This could be due to the current study being carried out from an African context, where collectiveness is more pronounced than in the Western world, where Tubiana et al.'s (2022) study was carried out. This suggests that by mutually supporting each other, knowledge workers can easily work collectively, which creates a work environment where they can practice division of labour. This ensures that specific tasks are assigned to specific workers with specific competencies, which results in the production of quality output. In support of this, it has been explained by Gerards et al. (2021) that when employees create a workplace where they communally support one another, they will try to help each other but also make an effort to engage in useful discussions on how to handle tasks effectively and efficiently. Additionally, Chi et al. (2017) agree with this finding with a view that when employees support each other, peer influence occurs, which may lead to learning and adoption of constructive behaviors that promote an individual worker's productive capacity. Furthermore, when an environment is created where workers can easily communicate and coordinate tasks, there will be

constant consultations and feedback, which reduces errors while delivering services. In agreement with these findings, Tayali (2025) and Udah et al. (2025) explained that when there is quick and reliable information shared, a culture of shared awareness is created. This encourages employees to be conscious of their actions, and they can share experiences about best practices that improve productivity.

Human Capital and Knowledge-worker Productivity

The findings of the study supported hypothesis three (H_3), which implies that a significant and positive relationship exists between human capital and knowledge-worker productivity. The standardized beta coefficient in the current study was 0.294, which is relatively similar to a prior study by Jibir et al. (2023), where the effect size was $\beta = 0.271$. The similarity in effect sizes could be due to the two studies being carried out from the African context, where the knowledge economy and labour market dynamics are quite comparable. Consistent with our findings, Shujahat et al. (2019) highlighted that when knowledge workers participate in the acquisition and application of knowledge, they tend to respond with ease and speed to client problems, which enriches the timely delivery of quality services. Furthermore, when knowledge workers possess skills that are relevant to the services they offer, they will adapt to changes effected within the workplace, allowing them to deliver quality services. In line with our findings, Kianto et al. (2019) explained that with technological advancement and the emerging changes in the workplace, skills have become a key tenet for knowledge workers, and once they are put to good use, quality services will be offered.

Mediating Role of Human Capital on the Relationship Between Social Interactions and Knowledge-worker Productivity

The fourth hypothesis (H_4) was supported, meaning that human capital mediates partially the relationship between social interaction and knowledge-worker productivity. The standardized value of the coefficient was $\beta = 0.11$. According to Hair et al. (2015) and Kline's (2023) effect size threshold recommendations, 0.11 is considered a small effect, but with a meaningful relationship. This implies that while human capital has a significant indirect effect on the relationship between social interaction and knowledge worker productivity, its influence is small. This points to the fact that many other factors may play a part in explaining the drivers of knowledge worker productivity, which further studies can examine. Based on the study findings, this indicates that when knowledge workers communicate, support each other, and coordinate their activities, they will be exposed to new skills and can easily share knowledge relevant to the tasks they carry out. Skills and knowledge are foundations that empower knowledge workers to make quality decisions directed towards efficient allocation and utilization of resources. However, prior studies (Chatterjee, 2025; Deepa et al., 2023) have downplayed the role of social interaction with a preference for remote working. Such studies have highlighted that with a vibrant ICT sector, especially in the developed world, knowledge workers prefer working independently using the available digital infrastructure to offer quality services. For the case of Uganda, the digital economy is still evolving, characterized by poor technological infrastructure. In such an environment, the current study has established that social collective actions situated within the workplace will offer opportunities to advance informal learning to navigate the evolving technological landscape. This will enhance the capacity of ICT workers to participate collectively to deliver quality services effectively. Tubiana et al. (2022) and Zaman et al. (2019) are in support of these findings, with an observation that social interaction creates a platform that nurtures collective learning, which is grounds for acquiring new knowledge and skills contextual to the organization. Gender and age, which were used as control variables, were found to be insignificant in determining knowledge-worker productivity. Education, which was also used as a control variable, was found to be significant in explaining variations in knowledge-worker productivity.

Conclusions

This study examined whether there exists a relationship between social interaction, human capital, and knowledge-worker productivity. Study results showed that human capital has a positive and significant partial mediating effect in the relationship between social interaction and knowledge-worker productivity. One of the lessons that we derive from this study finding is that not all skills and knowledge can be attained from school. The workplace environment is an alternative avenue for attaining knowledge and skills when employees share and learn from the experiences of others. This means that human capital is rooted and can be derived from the social units within an organization. Therefore, this means that human capital can be developed collectively from within the workplace. Moreover, through social interaction, ICT workers relearn best methods and unlearn practices that aren't relevant to the services they offer. Another lesson we derive from the study findings is that social interaction can promote collective actions where ICT workers initiate joint actions by complementing each other's tasks to deliver quality services while minimizing the cost of production. These findings apply to many developing countries where many organizations are constrained by resources to support the training needs of staff. Social interaction can serve as a mechanism for retooling and upskilling ICT workers in developing countries, where the resource envelope is limited. This boosts the human capital base and raises the capacity of ICT workers to deliver quality services efficiently.

Implications

Theoretical Implications

Utilizing the theory of CHAT, this study contributes to the literature by showing how to raise knowledge-worker productivity. This theory observes that human activities are culturally and socially constructed, which shape activity outcomes. Therefore, human capital in the form of skills and knowledge can be developed and improved from the social interactive networks that exist within the workplace. Social units are not just sources of sharing ideas, but they are also grounds for collective production and sharing of knowledge. Additionally, based on the theory of human capital, the study has shown that when individual workers possess relevant skills and knowledge, they can make better decisions to allocate and utilize resources efficiently. Therefore, while human capital theory is skewed towards advancing individual personal capacities, cultural-historical activity theory is premised on collective abilities that enrich knowledge worker productivity. The integration of the two theories bridges the collectivist and individualistic paradigms to comprehensively explain the drivers of knowledge worker productivity. Moreover, while digital tools tend to encourage individualistic remote working for ICT-based work, the theoretical contributions of cultural-historical activity theory have demonstrated that workplace interactions are still vital in advancing knowledge worker productivity.

Practical Implications

Firstly, ICT firms in Uganda need to create project-based teams while mixing ICT workers from different expertise areas and departments. This broadens the skill sets of ICT workers and promotes informal learning that emerges from social exposure to diverse functions. However, ICT firms may meet resistance from workers who are accustomed to their departmental norms and roles. To mitigate this, ICT firms need to create awareness among staff of the benefits of working in teams. Secondly, ICT firms in Uganda need to implement programs like peer coaching, where experienced ICT workers support those who are less experienced. This strengthens team building and also encourages knowledge transfer, which manifests through social learning. However, due to job security, some of the experienced ICT workers may not be willing to share knowledge with junior workers. To overcome this, ICT firms should recognize and incentivize coaching efforts. Thirdly, ICT firms need to support the creation of interest-based groups where ICT workers can meet to share experiences, knowledge, and technical skills. This will create an environment where they can communicate and also reciprocally support each other, which reduces errors and mistakes in knowledge work. Fourth, ICT firms need to coordinate tasks allocated to ICT workers and also interlink work units such that there is a smooth transition of services from one production level to another. This offers a foundation for building a value chain that nurtures a culture of transmission of services with ease from one person or work unit to another to enrich the timely delivery of quality services. Fifth, organizations need to consider selecting and promoting ICT workers based on social competencies of collaboration, communication, and networking skills. Sixth, ICT firms need to support ICT workers socially, materially, and financially to continuously acquire new skills and knowledge. However, many startup ICT firms may not have sufficient resources to support the training and development of their workers. To mitigate this, ICT firms need to identify and fund only the most critical training areas that align with the business needs.

Policy Implication

Uganda's ICT policy of 2014 was introduced with the motive of creating an environment that accelerates the growth of the ICT sector in the country. The policy advocates for the development of ICT innovation hubs across the country to offer a platform where ICT workers can collaborate and also access ICT tools to support the creation of ICT innovations. However, ICT innovation hubs exist in only a few public education institutions. The current study recommends that the government, through the Ministry of ICT, should expand ICT innovation hubs across the country. This will offer a platform where ICT workers can meet, collaborate, and share knowledge to advance the development of ICT innovations. On the side of educational institutions, the method of teaching ICT students has predominantly been the lecture method, where the instructor controls the learning practices. The current study recommends that educational institutions should incorporate group projects and prioritize peer learning programs in the teaching process.

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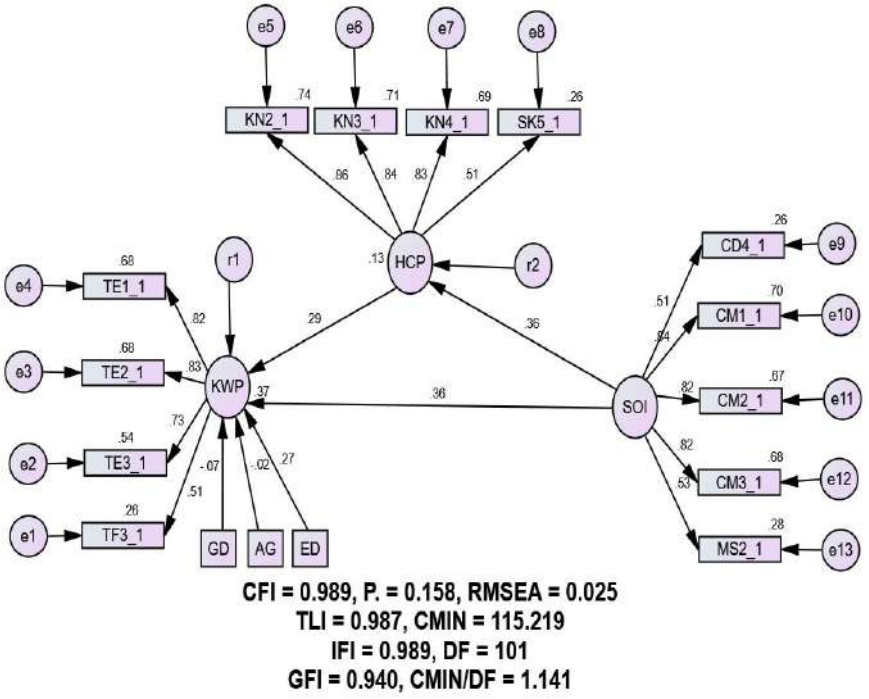
Zhang, B., Zhang, Q., Yao, C., & Liu, Z. (2024). The signaling paradox: Revisiting the impacts of overeducation in the Chinese labor market. *Education Sciences*, *14*(8), 900. https://doi.org/10.3390/educsci14080900

APPENDIX

Table II: Reliability and validity

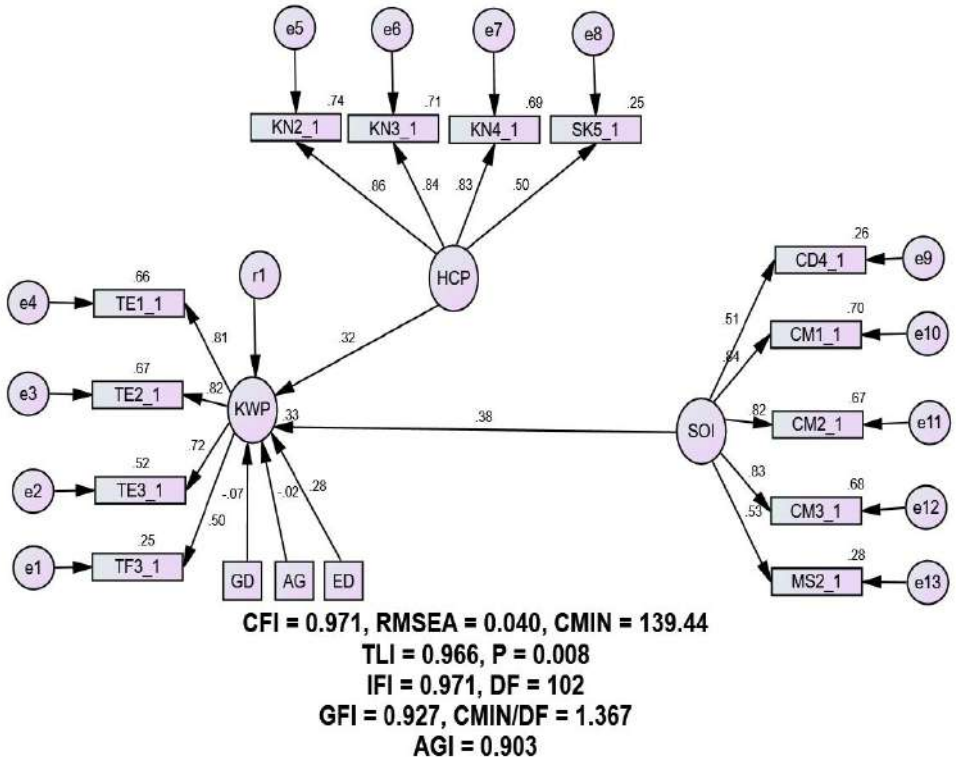
Variable	Dimension	Item Coding	Factor loading	Cronbach	Composite Reliability	AVE
Social Interaction.	Mutual support (MS)	MS1_1	0.862	0.842	0.836	0.673
		MS2_1	0.860			
		MS3_1	0.820			
		MS5_1	0.807			
	Coordination (CD)	CD1_1	0.798			
		CD2_1	0.858			
		CD3_1	0.824			
		CD4_1	0.821			
		CD5_1	0.653			
	Communication (CM)	CM1_1	0.841			
		CM2_1	0.813			
		CM3_1	0.830			
		CM4_1	0.834			
Human capital.	Knowledge (KN)	KN1_1	0.637	0.922	0.899	0.710
		KN2_1	0.865			
		KN3_1	0.838			
		KN4_1	0.836			
		KN5_1	0.819			
	Skills (SK)	SK2_1	0.822			
		SK3_1	0.821			
		SK4_1	0.828			
		SK5_1	0.829			
		SK6_1	0.621			
Knowledge worker productivity.	Task efficiency (TE)	TE1_1	0.843	0.846	0.862	0.615
		TE2_1	0.847			
		TE3_1	0.710			
		TE4_1	0.800			
	Task effectiveness (TF)	TF1_1	0.821			
		TF2_1	0.570			
		TF3_1	0.819			
		TF4_1	0.836			

Figure 1: Structural equation model (Mediated model)



Social Interaction (SOI), Human Capital (HCP), Knowledge-worker productivity (KWP), Gender (GD), Age (AG), Education (ED

Figure 2: Structural equation model (Unmediated model)



Social Interaction (SOI), Human Capital (HCP), Knowledge-worker productivity (KWP), Gender (GD), Age (AG), Education (ED)