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Relationship between Intellectual Capital and Employee Performance As Moderated By Knowledge Management Infrastructure at the Kenya Bureau of Standards

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Abstract

The research purpose was to establish the influence of intellectual capital on employee performance using post-positivism philosophy, mixed methods approach and case study design with random sampling technique, giving a sample of 390 employees of the Kenya Bureau of Standards. Data analysis involved descriptive statistics and inferential statistics using SPSS version 24. Findings showed a positive correlation, with knowledge management infrastructure - the moderating variable improving the R-Square value by 6.6 per cent. Regression analysis demonstrated a positive coefficient for the interaction term at 0.019, suggesting an improved impact of intellectual capital factors on employee performance, with a p-value (0.001) indicating the interaction was statistically significant, confirming that knowledge management infrastructure moderated the relationship between intellectual capital and employee performance. In conclusion, the effect of intellectual capital on employee performance is stronger when the knowledge management infrastructure framework is appropriately designed and effectively implemented. The study recommended that heads of marketing and ICT ensure integration and comprehensive handling of customer concerns, while heads of ICT and human resources ensure availability of: documented processes and communication to all employees; adequate information systems, databases and repositories with seamless frameworks for quality standards and routine practices. Comprehensive remedial measures on these human, structural and relational capital concerns would enhance policy directions that facilitate the entrenchment of knowledge management in the organisation and promote prudent utilisation of resources for improved employee performance.

Key words: Employee performance, intellectual capital, knowledge management, knowledge management infrastructure.



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INTRODUCTION

Employee performance is a multicomponent concept and process encompassing work achievement with behavioural engagements for the expected outcome (Pradhan & Jena, 2017). It remains a driving pillar for competitiveness in the current knowledge economy (Hernández et al., 2021), as observed in Sullivan and Wamba (2024), that firms with high performance are those in command of information on consumer needs, changing market trends and modern technological processes with transformative leadership. For competitiveness, knowledge-intensive organisations continually enrich their business processes supported by robust knowledge management systems. KEBS has entrenched organisational learning as one of its key performance features, making knowledge management a crucial pillar in its strategic pursuits.

Knowledge management as a discipline deals with the collection, processing, sharing, use and measurement of internal and external information potential of an organisation (Inkow, 2020). Aviv et al. (2021) recognised knowledge management as pivoted on a tripod of knowledge infrastructure, processes and intellectual capital. KAM – UNIDO (2020) demonstrated knowledge management as a crucial cog for success among manufacturing giants like the USA, China, Germany, Japan and the UK, thereby showing the significance of intellectual capital. KEBS operates on strategic plans accompanied by entrenched documented processes, procedures and repositories, which robustly support execution of tasks, decision making, problem solving, internal and external coordination, as well as organisational learning and suitable acculturation for its regulatory role.

Intellectual capital is a combination of human and non-human factors that define the capabilities of a firm concerning the mental frame of planning suitable activities, instruments and materials required, execution of related tasks, decision making, inherent problem solving and coordination of all internal and external requirements. Koech and Cheluget (2019) determined that intellectual capital comprises human capital (HC), structural capital (SC) and relational capital (RC). KEBS has

a comprehensive workforce of multidisciplinary contexts from diverse engineers to pure and applied scientists, economists and accountants to other supportive role anchors for human capital. There exists a robust system of instruments, equipment and ICT systems, databases and repositories that provide a versatile technology regime as structural capital supporting knowledge management.

This study involved knowledge management infrastructure (KMI) as a moderating factor. Fernandez and Sabherwal (2015) viewed knowledge management infrastructure as reflecting the long-term foundation of an organisational knowledge management system, comprising organisational culture, structure, information technology infrastructure, common knowledge and physical environment. The study involved organisational culture (OC), organisational structure (OS) and information technology (IT) as constructs. The investigation revealed that a large majority of respondents were satisfied with the prevailing status of employee performance, depicting adequacy of intellectual capital support to employee performance and effective provision of knowledge management infrastructure for optimisation of employee performance.

The main objective of the study was to establish the effects of intellectual capital on employee performance under the moderating influence of knowledge management infrastructure in Kenya. This was decomposed into three specific objectives to guide the investigations: to demonstrate the effects of intellectual capital on employee performance; to establish the influence of knowledge management infrastructure on employee performance; and to determine the moderating effect of knowledge management infrastructure on the relationship between intellectual capital and employee performance at the Kenya Bureau of Standards. Each objective yielded a null hypothesis for testing to validate conclusions of the study, as follows: H₀1: there is no significant effect of intellectual capital on employee performance; H₀2: there is no significant influence of knowledge management infrastructure on employee performance, and; H₀3: there is no significant moderating effect of knowledge

management infrastructure on the relationship between intellectual capital and employee performance at the Kenya Bureau of Standards.

LITERATURE REVIEW

Theoretical Review

The Human Capital Theory (HCT)

When Schultz published "Capital Formation by Education" in 1960 and "Investing in Human Capital" in 1961, and Becker published "Investing in Human Capital" in 1962, they laid the foundation of human capital theory. They viewed human capital as a prerequisite for economic growth, created on the basis of employee-enhanced knowledge, skills and abilities, making it an additional source of income. Human capital theory posits that education and training promote employee productivity by imparting useful knowledge and skills, thereby raising workers' future income and increasing their lifetime earnings.

The key assumption of human capital theory is that employees possess an innate and acquired set of skills and abilities that, through education and training, enhance their productive capacity (Becker, 1993). In purpose, the theory holds that employees increase their productivity through higher education and skills training, which enhances the intangible economic value of the employees. It is therefore a fundamental postulation that KEBS, as a modern entity, embraces employee education and training as a strategic item underlying its pursuits for optimisation of employee performance. A key weakness of human capital is that, despite inherent heterogeneities, it imposes a linear single pathway analysis on the complex relationship between education and work. The theory remains relevant in the sphere of human capital development, making human capital a suitable construct in this study. It is envisaged that adherence to the dictates of its theory ensures adequacy of relevant knowledge, skills, experience and attitudes that facilitate KEBS preparedness to entrench capabilities for effective regulatory effectiveness.

Knowledge-Based View (KBV) of the Firm

Drucker (1993) first conceived the knowledge capital concept before Grant (1996) declared the

knowledge-based view (KBV) of the firm, which Fernandez and Sabherwal (2015) documented as unique, valuable, difficult to imitate and not substitutable. KBV posits that an organisation exists as an entity operating on knowledge interactions featuring: employee competencies, organisational internal structures and environmental external structures; with knowledge as the fulcrum for competitiveness. Grant (1996) held that an employee is the primary actor in knowledge creation and sharing and is its principal repository for protection and application. It is prudent that KEBS operates an effective tripod of employee adequacy in terms of competence and personnel numbers, with robust internal mechanisms that support operational requirements, and robust systems that facilitate interaction with critical external environmental knowledge features in order to satisfactorily undertake its regulatory functions.

Knowledge theory underpins the knowledge management system in an organisation and informs the suitability of the platform responsible for knowledge creation or capture, sharing or transfer, as well as utilisation or application, including critical structural features for employee performance. Curado (2014) opined that knowledge asymmetry among firms in an industry defines their performance differentials, owing to resultant variation in their capabilities and competencies. Inability to replicate tacit knowledge as a component of organisational knowledge base largely contributes to knowledge asymmetry among firms. One weakness of the theory is that it has massive causal ambiguity, making it inimitable, with application of knowledge features that make one firm or industry successful, remaining unique to itself.

Herzberg's Two-Factor Theory

The theory was developed in 1959 through Fredrick Herzberg data collection in Pittsburgh area, from a sample of 203 engineers and accountants. The outcome was the development of Herzberg's motivation-hygiene theory, also called the two-factor theory, which held that job satisfaction and job dissatisfaction have their own sets of factors (Herzberg et al., 1959; Herzberg, 1991). The theory holds that for optimal

performance, employees need to experience motivation and job satisfaction, which are influenced by motivator and hygiene factors. Presence of motivators such as work itself, responsibility, achievement, recognition, opportunity for growth, and self-development leads to job satisfaction, while deficiency in hygiene factors such as company policies and administration, work conditions, salary, supervision, relationship with managers and peers stimulates dissatisfaction (Herzberg, 2003).

The purpose of the theory is that management continually promotes both continua to attain employee satisfaction that facilitates performance optimisation. However, in the auspices of two-factor theory, Deb (2021) found supervision and interpersonal relationships important predictors of job satisfaction, motivation factors, instead of being hygiene facets. Similarly, Kotni and Karumuri (2018) and Rahman et al. (2018) found that hygiene factors such as salary and job security played a major role in motivating employees, thus appearing motivators rather than hygiene factors in action. The main assumption of the theory is that the workforce remains consistent with the expectations of Maslow's hierarchy of needs. For this study, the theory provides a framework for assessing potential dynamics of intellectual capital,

such as human capital and relational capital and their influences on employee performance.

It is therefore pertinent that KEBS, in consenting to expectations of this theory, upholds the practice of employee motivation using system features, with procedurally in-built measures that address motivator and hygiene factors in deliberate attempts to sustain employee motivation and job satisfaction. It suffices to note that the inadequacy of employee motivation and job satisfaction are predisposing factors to underperformance. Given that KEBS needs a motivated workforce in order to effectively undertake its regulatory functions, it is mandatory that it embraces tenets of this theory for functional adequacy.

Conceptual Framework

The study considered knowledge management resources as an independent variable on employee performance, the dependent variable, with knowledge management infrastructure as a moderating variable. Intellectual capital was decomposed into human capital, structural capital and relational capital, while knowledge management infrastructure was broken down to culture, structure and information technology. Employee performance was considered under constructs of task, adaptive and contextual performance dimensions; See Figure 1.

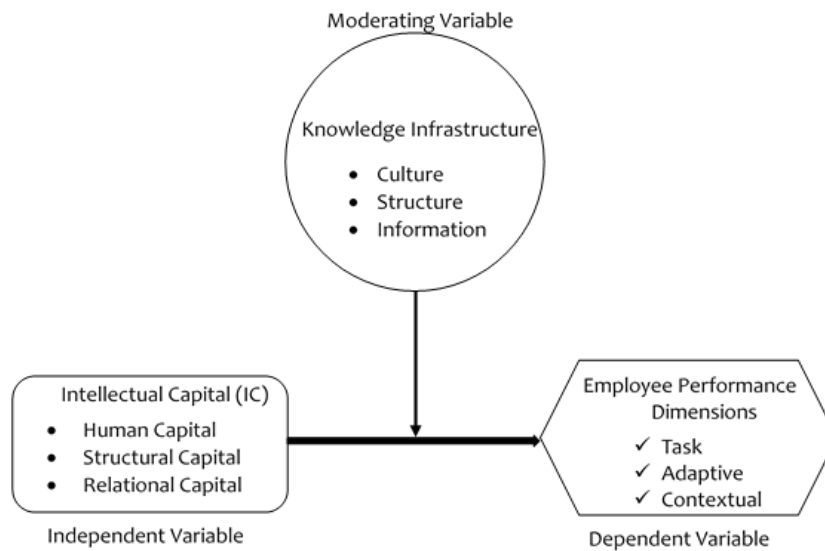


Figure 1: Conceptual Framework (Source: The Researcher)

Empirical Review

Employee performance - the dependent variable in the study has become a cutting-edge concern for organisational competitiveness in the knowledge economy. For workforce management as a competitive advantage, the suitability of human capital (HC), comprising relevant skills, knowledge, and experience, is necessary for the development of robust structural capital (SC) and versatile relational capital (RC) as requirements for effective employee performance (USA, 2022). Hurtado-Palomino et al (2024) argued that performance is a latent concern for management that requires diverse strategies, such as structural capital and absorptive capacities, to enhance delivery. Performance connotes a dual perspective of behaviour and outcomes (Al-Husseini, 2023), behaviour being what an individual does at the work station, relevant to organisational goals (Abdelwahed et al., 2023), while outcome refers to results and consequences of that corresponding behaviour (Al-Husseini, 2023). Clarity of expected behaviour and outcomes is essential for design, execution and measurement of employee performance, as it also informs appropriateness of recruitment, placement, induction, training and development of human resources.

In the challenging knowledge economy business atmosphere, Peiró et al. (2020) observed that performance has become a fundamental requirement for the achievement of organisational survival, growth and sustainability. Effective knowledge management becomes a necessity given its fundamental role in determining local and global competitiveness. Dabbas and Daud (2024) averred that knowledge management drives employee performance by inculcating a culture of continuous learning and innovation, improving decision-making capabilities, and promoting prudent use of resources. This buttressed Inkow's (2020) assertion that knowledge management with both internal and external knowledge flow includes intellectual capital that drives its value addition to administrative and production functions of a firm. To facilitate performance optimisation, it is crucial that employee knowledge, skills, experience, ability and attitude are concomitant with job requirements during employee placement, and tagged along with continued training and

development as determined through systematic, documented, regular and deliberate performance evaluation.

Alrowwad et al. (2020) posited that IC provides knowledge, experience, information technologies, copyrights and value-added interactions necessary for employee performance enhancement; while Akdağ and Oter (2020) viewed HC as employee competence; SC as culture and intellectual property (IP) rights; and RC as brand and customer relationships. Relatedly, Ahmad et al. (2022) asserted that intellectual capital (IC) comprises three fundamental facets of human, relational, and structural capital, which are diversely exploited for the enhancement of employee performance. Similarly, Zhang et al. (2022) posited that IC facilitates value creation through the utilisation of knowledge embedded in employees, infrastructure, and stakeholder relationships. These studies entrenched the intellectual capital tri-polar context of human, structural and relational capital facets in a firm.

Farzaneh et al. (2022) illustrated diverse constituents of IC as comprising: human capital (HC) with employee talent, education, and experience; structural capital (SC) as organisational capabilities, information systems, and databases; and relational capital (RC) being formal and informal relationships among employees, customers, suppliers and regulators. In unique ways, organisations have variously utilised these facets of intellectual capital with diverse impacts on employee performance and exploited them differently for improving dynamic capability. In Zimbabwe, Munyoro, Machimbidza and Mutula (2022) found that knowledge management technology impacts employee performance, just as in Uganda, Asimwe and Barigayomwe (2024) determined the valuable role of intellectual capital on employee performance.

Sarker (2022) perceived SC as organisational processes, databases, and intellectual property that outlast employee departure, and categorised them into organisational, process, and innovation dimensions. While Bozutti (2020) viewed RC as involving relationships with customers, suppliers, and stakeholders for value creation, Ramírez-Solis

et al. (2022) emphasised the role of strategic alliances in the utilisation of external knowledge and innovation for the optimisation of employee performance. According to Audretsch (2018), Germany invests heavily in maintaining a skilled workforce, supported by versatile structural capital and advanced technology, linking intellectual capital to productivity, giving Germany the highest manufacturing contribution to GDP in the European Community. Conduct of effective regulatory function by KEBS is hinged on its preparedness on all fronts of intellectual capital facets – HC, SC and RC, which dictates continued evaluation and improvements for employee performance.

The foregoing demonstrates that effective performance is linked to intellectual capital, including the critical concept of technology acceptance, which plays a crucial role in driving technologically supported employee performance management processes; and there exist significant interdependencies among HC, SC and RC. Oliveira et al. (2020) argued that RC is a consequence of HC, thereby deepening McDowell et al. (2018) assertion that robust HC is necessary for simultaneously achieving versatile SC and RC. This was confirmed when Ahmad et al. (2022) posited that a firm can convert its good relations into a rich source of information for enriching the technical value of its SC and HC. On this basis, Qalati et al (2022) held that the significance of intellectual capital to a firm is inherent in its ability to improve employee productivity and performance, and for enhancing its competitiveness (Abdelwahed et al., 2023). Based on KBV, organisational performance is hinged on a knowledge base that is dictated by knowledge embedded as employee competences, effective processes, and pragmatic relationships (Chen & Nonaka, 2022). It can be discerned that the extent to which intellectual capital influences employee performance is also affected by the degree of interdependency among the facets - HC, SC and RC, that will again be firm-specific.

Knowledge management infrastructure is a critical feature in the development, operations and maintenance of organisational systems. This study considered three infrastructure constructs -

organisation culture, structure and information technology. Ganguly et al. (2019) declared that through appropriate infrastructure, employee knowledge is transformed into organisational knowledge; a position buttressed in Ozgun et al. (2022) that employee knowledge is critical in facilitating knowledge creation, building organisational absorptive capacity, and performance competitiveness. Liu and Jiang (2020) held that SC is a conduit for drawing required tacit knowledge for organisational use, while Jacob et al. (2023) asserted that technology facilitates improvements in employee satisfaction, performance efficiency and productivity levels, serving as a fulcrum for knowledge influence on employee performance and impacting organisational performance.

In Ethiopia, Meseret (2020) found that organisational structure influences employee effective delivery, enhances coordination of tasks and promotes efficiency in employee performance; concluding that organisational structure also influences employee/supervisor relations and affects information flow in the organisation. In Ghana, Seth and Xiaofang (2021) demonstrated that ICT infrastructure in a firm had a statistically significant impact on company performance, while Akpa et al. (2021) investigation demonstrated the influence of organisational culture on employee performance in Nigeria.

In a Kenyan study on the influence of organisational structure on mobile-commerce performance, Muriu (2019) determined a strong and positive correlation, concluding that structure facilitates coordination for employee performance, growth and organisational effectiveness. The study displayed the simultaneous importance of technology infrastructure in enabling employee performance for competitiveness. Similarly, Karungani and Ochiri (2017) found a significant positive effect of ICT infrastructure on employee performance in Kenya. It is discernible from the foregoing that with agile infrastructure status, a firm with effective culture and structure flourishes creative ideas that support innovation for value addition, raising customer satisfaction and loyalty. These studies demonstrated that knowledge management infrastructure has a significant

influence on employee performance, and therefore, the effectiveness of KEBS in its regulatory functions is certainly affected by its infrastructure portfolio.

In another Kenyan study, Koech and Cheluget (2019) held that using strategic instruments such as secrecy, complex design, and lead time protects IC by hedging off competitors from accessing partially codified knowledge; thereby illuminating the vitality of SC in facilitating performance. They held that patents, trademarks, copyrights and licenses provide business advantage through knowledge protection for internal exploitation, making structural capital an effective source of competitive advantage. Relatedly, Akinyi (2017) highlighted the significance of knowledge enablers such as technologies, systems and automated operations in enhancing employee performance in Kenya; through suitable culture, information technology, and adequacy of relevant knowledge; to support innovation, prompt decision making and problem solving. The commonality of certain aspects of HC, SC and RC as elements of knowledge management infrastructure provides a linkage with pivotal impacts, lending credence to knowledge management infrastructure having a potentially moderating effect on the relationship between intellectual capital and employee performance.

Aforementioned studies highlight the significance of intellectual capital to employee performance, making it fundamental to establish the preparedness of KEBS in terms of HC, SC and RC, for its noble regulatory function. The studies pointed to the fact that to exploit inherent knowledge, technical expertise, skills, experience, wisdom, attitude, commitment, and abilities of employees, a supportive culture is a necessity, with robust SC as a critical facet, in facilitating knowledge generation, processing and utilisation for employee performance optimisation. From RC effects on performance findings of some studies, it becomes crucial to ascertain the robustness of KEBS agility for the regulatory functions, courtesy of being in a common knowledge management ecosystem with the manufacturing fraternity.

METHODOLOGY

The study adopted post-positivism philosophy, case study design with a simple random sampling technique and a mixed methods approach. A pilot study was done, and only items scoring factor loading above 0.5 in construct validity were retained in the questionnaire; a reliability test for internal consistency was also conducted with all variables scoring above the 0.7 threshold for Cronbach's Alpha coefficient. Through Yamane's (1974) formula, a sample of 390 respondents was obtained, to which a questionnaire was administered through the drop-and-pick technique and primary data were collected. A total of 362 questionnaires were returned, with 345 determined fit and used for analysis. Quantitative data obtained from closed-ended questions were analysed for descriptive and inferential statistics, aided by SPSS version 24, with a multiple linear regression model adopted for testing hypotheses. Open-ended questions yielded qualitative data that underwent thematic analysis. The following multiple linear regression steps were adopted to establish the moderating effect of knowledge management infrastructure (KMI) on the relationship between intellectual capital (IC) and employee performance, the level of significance at $p < 0.005$:

$$Y = \beta_0 + \beta_1 IC + e \dots\dots\dots (1)$$

$$Y = \beta_0 + \beta_1 IC + \beta_2 KMI + \beta_3 IC.KMI + e \dots\dots\dots (2)$$

Where:

$\beta_1, \beta_2, \beta_3$ = Beta Coefficients

IC = Intellectual Capital

KMI = Knowledge Management Infrastructure

IC.KMI = interaction term of IC and KMI

β_3 , estimates the moderation effect of KMI on the relationship between IC and employee performance. A statistically significant beta value/regression coefficient indicates that the KMI significantly moderates this relationship.

RESULTS AND DISCUSSION

The findings for both the descriptive and inferential results are discussed to aid study conclusions and recommendations.

Descriptive Statistics

Tables are used to present outcomes of descriptive analyses. The IC had 12 items for assessment, and the outcome is presented in Table 1, showing all

three constructs – human capital, structural capital and relational capital.

Intellectual Capital (IC) Descriptive Outcomes

The items for all constructs were analysed in Tables 1, 2 and 3.

Table 1: Intellectual Capital (IC) Descriptive Outcomes

Item Ref	Parameter	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	STD
HC1	Employees are actively involved in decision-making and problem-solving at the workplace	4	21	25	43	7	3.28	1.02
HC2	Our employees have exposure to the latest trends and practices in their fields	2	15	22	46	15	3.56	0.99
HC3	Employees are engaged in training and development programs for career growth and enhanced expertise.	2	8	6	55	29	4.01	0.92
HC4	Our employees continuously engage in workshops and seminars to sharpen their professional skills	2	6	13	51	28	3.96	0.93
	Mean	3	12	16	49	20	3.70	0.97
SC	Structural Capital							
SC1	Our organisation has routine frameworks for harmony, quality standards and practices across all departments.	1	12	15	55	17	3.76	0.91
SC2	Our company has documented processes, well communicated to employees and promotes effective work execution.	2	8	5	54	31	4.04	0.93
SC3	The company has a strategic plan, clear to my workplace, guiding performance activities in the company	4	2	5	46	43	4.2	0.96
SC4	Our organisation has	2	1	8	53	36	4.2	0.8

	information systems, databases and repositories that facilitate knowledge storage and retrieval.							
	Mean	2	6	8	52	32	4.05	0.9
RC	Relational Capital							
RC1	Our organisation regularly conduct customer surveys to identify areas requiring improvement	1	6	9	59	25	4.01	0.84
RC2	Our organisation has adopted customer integration in all departments for comprehensive handling of customer concerns	3	6	11	58	22	3.89	0.93
RC3	Our organisation has established strategic alliances with other firms for collaborations and partnerships	3	4	16	59	18	3.84	0.88
RC4	Our organisation has adopted supplier integration practices	2	7	29	48	14	3.64	0.89
	Mean	2	6	16	56	20	3.85	0.89

The outcome was summarised from statement parameter results to construct performance, and Table 2 gives a summary of the constructs and their comparative scores.

Table 2: Intellectual Capital (IC) Constructs Summarised Scores

Item No.	Construct	STD (%)	DA (%)	N (%)	AG (%)	STA (%)	MEAN	STD DEV
HC	Human Capital	3	12	16	49	20	3.70	0.97
SC	Structural Capital	2	6	8	52	32	4.05	0.9
RC	Relational Capital	2	6	16	56	20	3.85	0.89
Grand Mean		2	8	14	52	24	3.87	0.92

In appreciating challenges bedevilling business competitiveness, there have emerged global challenges such as market uncertainties, rapid technological changes, disrupted demand and shortened product life cycles (Kim, 2020). The scenario has demanded more intellectual capital adaptability than ever before, given the potential impacts of competition from technological

advancements, globalisation and ubiquitous computing. The significance of Castro et al. (2019) view that IC comprises culture, knowledge, processes, capabilities, intellectual property, and relational networks is buttressed in the desired employee competence, which these features confer towards performance optimisation.

The study exposed the significance of the constructs just as Ahmad et al (2022) emphasised the need for effective HC in the establishment and utilisation of organisational databases, further justifying their interdependency; a fact buttressed in Liu et al. (2022) position that competence of employees in a firm affects efficiency of SC performance. Similarly, Xu and Li (2022) held that human and relational capital have a significant influence on SC as a key driver of innovation performance. Relatedly, Huang and Huang (2020) declared that SC focuses on organisational efficiency; covers the systems, practices, and

processes of an organisation; and involves non-physical components such as databases and business strategies. They advocated for managers to stimulate employees into codifying their tacit knowledge into the organisation's database for storage and retrieval, sharing and utilisation.

When Kucharska (2022) averred that SC includes all non-human stores of knowledge in organisations, the study highlighted the significance of organisational processes and infrastructure in empowering HC for performance. The study asserted that organisations heavily rely on intangible assets to reinforce innovation and enhance employee performance. Further, Table 2 was transformed to outcomes of disagreeing and agreeing responses, with neutral responses maintained for those not explicit. Thus, Table 3 involved summing up STD with DA into a set of disagreeing, while AG is lumped up with STA into agreeing.

Table 3: Intellectual Capital Descriptive Outcome Snapshot

Item No.	Construct	Disagreeing (%)	Neutral (%)	Agreeing (%)
HC	Human Capital	15	16	69
SC	Structural Capital	8	8	84
RC	Relational Capital	8	16	76
Grand Mean		10	14	76

The summary showed that slightly less than seventy per cent of the respondents expressed satisfaction, with over thirty per cent registering dissatisfaction with human capital management (HCM). The dissatisfaction may be related to: technological challenges, requiring reskilling and upskilling of employees (Acemoglu & Restrepo, 2017); and demographic shifts or a combination of factors, making it necessary to optimise both human and technological capabilities (Zahi, 2025). The other significant feature could be compensation expectation mismatch: Ahmad (2018) declared that sufficiency of pay and promotion policies confer satisfaction with work and commitment to the firm; Akinwale and George (2020) averred that salary drives job satisfaction, while Mehrzad and Rostan (2021) posited that salary levels influence employee turnover. Recently, Mwiathi (2021) found that health and education are critical in HC, emphasising increased access to health insurance and improved education

quality as critical focus for HCM and employee performance enhancement. Herzberg's two-factor motivation theory confirms that these factors have comprehensive effects on HCM, with direct influence on employee satisfaction and performance enhancement.

SC performance had a marked improvement relative to HC, as approximately eighty-four per cent of the respondents were satisfied with the existing portfolio, and only sixteen per cent expressed displeasure. It is therefore pertinent that efforts to capture concerns leading to dissatisfaction be judiciously expended, so as to harness their productivity and attain enhanced job satisfaction. Gazi et al. (2024) held that intangible assets ought to be managed with a view to enhancing company productivity and performance, in addition to customer satisfaction. In this way, the firm, through intellectual property rights and

other intangible assets, attains value-added and business growth.

Performance of RC was midway between HC and SC, recording respondents' acceptance of seventy-six per cent, while dissenting view portfolio increased to twenty-four per cent, calling for concerted efforts for improvements. Aspects that make employees dissatisfied with workplace dynamics are varied; Otor (2015) viewed customer capital in the realms of connections, interactions, loyalty, and goodwill between firms and stakeholders. As such, effective RC aims at developing beneficial relationships, with customer concerns being key, making customer relationship management (CRM) strategies critical for improving performance. This was confirmed in Altarifi's (2020) finding of a strong correlation between CRM effectiveness and marketing success of a firm.

In the overall assessment, the IC variable performance reflected a seventy-six per cent satisfaction and twenty-four per cent dissatisfaction among respondents, depicting that measures for improvements need to be implemented as a matter of priority. Much focus needs to be put on the needs dynamics that lead to effective employee growth, that influence workforce competitiveness and organisation performance (Lin et al., 2017), which requires strategic mitigation of potential inhibitors like globalisation, technological advancements, ubiquitous computing and demographic shifts. Graham et al. (2017) illuminated the effects of digitisation on labour dynamics in relation to machines, the relevance of skills and the effects of the use of digital technology on employee compensation. Similarly, Hanine and Dinar (2022) emphasised the impact of technology on man-machine balance, job design and skills instability as concerns of HC in the fourth industrial revolution (4IR). This has had consequences like generational and cultural gaps, career management practices and such reconfigurations of work as reengineering, telework and crowdsourcing, among others. Strategic assessment of these is critical in achieving the HCM paradigm that supports modern firms and attendant competition.

Linking human capital to relational capital is crucial for the effective utilisation of inherent synergy. Relational capital as a strategic alliance with stakeholders is a significant source of external knowledge and innovativeness to exploit new ideas and technologies for enhancing performance (Ramirez-Solis et al., 2022). It exposes significant utility relations with customers, competition, regulators, and interested parties, which can be tactfully harnessed for optimal individual and institutional benefits, including human capital dimensions. The relations potentially affect both current needs and future expectations of the firm, making customer relationship management a pivotal activity. This further expounds the benefits related to the linkage between relational and human capital for performance enhancement, both at the individual and organisational levels.

Ozkan, Cakan & Kayacan (2017) appreciated structural capital as comprising company structure, strategy, processes and systems; and emphasised that structural capital facilitates knowledge creation, sharing and utilisation. They held that structural capital provides linkage for the utilisation of human capital and relational capital in heterogeneous ways among firms within a sector. From the foregoing, it is critical that KEBS undertakes remedial measures to ensure the fitness of the strategy and practice of intellectual capital factors for enhanced employee performance.

Knowledge Management Infrastructure (KMI) Descriptive Outcomes

The outcomes of descriptive analyses were expressed, using tables, for all the variables and their constructs. Tables 4, 5 and 6 illustrated the results obtained.

Table 4: Knowledge Management Infrastructure Outcome Tabulated

ITEM No.	Parameter	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	STD
OC	Organisational Culture							
OC1	Employee trust in the organisation that supports team spirit and knowledge sharing as a corporate practice is present	3.19	2.13	14.89	50.00	29.79	4.01	0.91
OC2	I am encouraged to learn for improved performance as part of the organisational core values	2.13	2.13	6.38	44.68	44.68	4.28	0.85
OC3	I am always provided with resources and necessary support for performance	4.26	10.64	14.89	46.81	23.40	3.74	1.07
OC4	Performance is emphasised as part of our organisational culture.	1.06	4.26	4.26	41.49	48.94	4.33	0.83
OCM	Mean	2.66	4.79	10.11	45.75	36.70	4.09	0.92
OS	Organisational Structure							
OS1	I experience effective communication with the employees and management, enhancing employee performance.	3.19	7.45	10.64	52.13	26.60	3.91	0.98
OS2	The current structure promotes teamwork among individuals and departments, facilitating employee performance in the company.	2.13	13.83	14.89	47.87	21.28	3.72	1.02
OS3	The structure facilitates knowledge transfer in the firm,	1.06	11.70	20.21	42.55	24.47	3.78	0.99

	promoting employee performance.							
OS4	Allows interactions that motivate employee creativity and career progression in the firm, enhancing employee performance	2.13	9.57	30.85	40.43	17.02	3.61	0.95
OSM	Mean	2.13	10.64	19.15	45.76	22.34	3.76	0.99
IT	Information Technology							
IT1	Our company has adequate Internet and Intranet facilities that sufficiently serve the organisation for information and communication, promoting employee performance	4.26	6.38	10.64	44.68	34.04	3.98	1.05
IT2	Our company emphasises employee adoption of new technology for work performance and knowledge sharing	1.06	7.45	12.77	50.00	28.72	3.98	0.9
IT3	Our company uses technology to promote group learning and collaboration.	2.13	7.45	19.15	51.06	20.21	3.8	0.92
ITM	Mean	2.48	7.09	14.19	48.58	27.66	3.92	0.96
KMIGM	Grand Mean	2.31	7.51	14.48	46.70	28.90	3.92	0.95

The outcomes were summarised from statement parameter results to construct performance. Table 2 gives a summary of all the constructs and their comparative scores, summarised for ease of interpretation.

Table 5: Knowledge Infrastructure Constructs Summarised Scores

Item No.	Construct	STD (%)	DA (%)	N (%)	AG (%)	STA (%)	M	SD
OC	Organisation Culture	2.66	4.79	10.11	45.75	36.70	4.09	0.92
OS	Organisation Structure	2.13	10.64	19.15	45.76	22.34	3.76	0.99
IT	Information Technology	2.48	7.09	14.19	48.58	27.66	3.92	0.96
KMI	Grand Score	2.31	7.51	14.48	46.70	28.90	3.92	0.95

From the constructs' performances, the variable performance was drawn as shown in Table 3.

Table 6: KMI Snapshot of Descriptive Outcome

ITEM	CONSTRUCT	DISAGREEING	NEUTRAL	AGREEING
OC	Organisation Culture, (%)	7.45	10.11	82.44
OS	Organisation Structure, (%)	12.77	19.15	68.08
IT	Information Technology, (%)	9.57	14.19	76.24
KMI	VARIABLE MEAN, (%)	9.93	14.48	75.59

From the findings of the study (M=3.92; SD=0.95), it was evident that responses to the 11 statements used to explain KMI, with an overall mean of 3.92 and a standard deviation of 0.95, demonstrated that the majority of the respondents agreed with the parameters that measured KMI. About 76 per cent of the participants agreed with organisational KMI as suitable, meeting expectations in their assessment, with close to 10 per cent disagreed, and 14 per cent remained undecided, depicting that management ought to

determine the sources of inability to agree by 24 per cent of the participants.

Employee Performance (EP) Descriptive Outcomes

The dependent variable EP had 12 items for assessment, and the outcome was obtained as presented in Table 7 for the three constructs adopted – Task, adaptive and contextual performance dimensions.

Table 7: Employee Performance Outcomes Tabulated

Item No.	EP Constructs	SD (%)	D (%)	N (%)	A (%)	SA (%)	Mean	SD
TP	Task performance							
TP1	I always meet the work quality required	0.00	4.26	8.51	51.06	36.17	4.19	0.77
	Planning and organising work is a task I adequately attain	1.06	1.06	7.45	58.51	31.91	4.19	0.71
TP2	I am result-oriented in line of our operating culture	1.06	2.13	5.32	48.94	42.55	4.3	0.76
TP3	Prioritising tasks to dispense is within my discretion	0.00	7.45	11.70	51.06	29.79	4.03	0.85
TPM	Mean,	0.71	3.55	8.16	52.84	34.75	4.18	0.77
AP	Adaptive Performance							
AP1	I am able to keep my job knowledge up-to-date	0.00	7.45	6.38	44.68	41.49	4.2	0.86
AP2	I readily learn new tasks, technologies and procedures making my job skills up-to-date	1.06	2.13	7.45	55.32	34.04	4.19	0.75
AP3	I readily adjust my work goals whenever necessary	1.06	3.19	6.38	51.06	38.30	4.22	0.79
AP4	I always undertake problem-solving creatively	1.06	1.06	5.32	57.45	35.11	4.24	0.7
APM	Mean	0.80	3.46	6.38	52.13	37.24	4.21	0.78
CP	Contextual Performance							
CP1	I am a consistent participant in team activities at work	0.00	3.19	3.19	53.19	40.43	4.31	0.69
CP2	I find it easy cooperating with others at work	0.00	2.13	3.19	53.19	41.49	4.34	0.65
CP3	I experience effective communication in the execution of my work	0.00	3.19	7.45	55.32	34.04	4.2	0.71
CP4	I commonly volunteer to undertake tasks beyond my responsibility for purposes of effective work execution	1.06	4.26	7.45	43.62	43.62	4.24	0.85
CP5	I like taking challenging assignments in my work	0.00	4.26	5.32	50.00	40.43	4.27	0.75
CPM	Mean	0.21	3.41	5.32	51.06	40.00	4.22	0.76
EPGM	Grand Mean	0.57	3.47	6.62	52.01	37.33	4.20	0.77

The outcomes were summarised from statement parameter results to construct performance. Table 8 gives a summary of all the constructs and their

comparative scores summarised for ease of interpretation.

Table 8: Employee Performance Constructs Summarised Scores

Item No.	EP Constructs	STD (%)	DA (%)	N (%)	AG (%)	STA (%)	M	SD
TP	Task	0.71	3.55	8.16	52.84	34.75	4.18	0.77
AP	Adaptive	0.80	3.46	6.38	52.13	37.24	4.21	0.78
CP	Contextual	0.21	3.41	5.32	51.06	40.00	4.22	0.76
<i>EPGM</i>	<i>Mean</i>	0.57	3.47	6.62	52.01	37.33	4.20	0.77

Performance of the variable was drawn as shown in Table 9 from the performance of the constructs.

Table 9: EP Descriptive Outcome Snapshot

ITEM	CONSTRUCT	DISAGREEING	NEUTRAL	AGREEING
TP	Task Performance, (%)	4	8	88
AP	Adaptive performance, (%)	4	7	89
CP	Contextual Performance, (%)	4	5	91
<i>EPGM</i>	<i>Mean, (%)</i>	4	7	89

From the findings of the study (M=4.20; SD=0.77), it was evident that responses to the 12 statements used to explain EP, with an overall mean of 4.20 and a standard deviation of 0.77, demonstrated that the majority of the respondents agreed with the indicators used to measure EP. Most of the respondents (eighty-nine per cent) agreed with organisational EP as suitable, meeting expectations in their assessment, with four per cent disagreeing, while seven per cent remained undecided, depicting that management ought to determine the sources of inability to agree by eleven per cent of the employees. The fundamentals of task performance dimension were displayed when Pradhan and Jena (2017) investigated employee performance under task, adaptive and contextual facets; and held that task performance concerns explicit job behavior with cardinal job responsibilities under job description - requiring cognitive ability, facilitated by task knowledge, task skills and task habits, the main antecedents being prior experience and ability to do the job. There appeared to be a need for minor adjustments towards the adequacy of competences among KEBS employees to sustain cognitive requirements in the organisation for the execution of task performance.

Similarly, Park and Park (2019) study postured adaptive performance as employee features depicting fitness to changing job requirements that,

at the individual level, enhance employee capability and promote career success, while at the organisational level, accords positive outcomes such as change management, organisational learning and exceeding customer expectations. Krekel et al. (2019) opined that it is about employee fit into teamwork, allegiance, dispensing extra assignments, solving difficult situations, sharing critical resources, supporting decisions for improvements and exhibiting cooperation in times of need. The study revealed that measures to entrench adaptive performance preparedness exist in KEBS, though some adjustments may be undertaken to enhance sustained optimal employee performance.

Inferential Analysis Outcome

The data was exposed to inferential analyses to determine the existence of correlation and regression relationships.

Correlation Determination

This section provides Pearson's correlation analysis to determine the relationship strength and direction between IC and EP and between KMI and EP. The test findings presented in Table 10 are interpreted in accordance with Armstrong (2019), in which $r \geq 0.7$ indicates a strong relationship, $r = 0.5$ to 0.69 is a moderately strong relationship, whereas $r < 0.5$ indicates a weak relationship.

Table 10: Correlation Analysis between IC and Employee Performance

		Performance	IC	
Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
IC	Pearson Correlation	.543**	1	
	Sig. (2-tailed)	0.000		

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

Findings in Table 10 showed that IC and employee performance have a positive and moderately strong relationship ($r=0.543$, $p<0.05$), depicting that a change in IC leads to a change in employee performance in the same direction. The study outcome is consistent with Agostini and Nosella's (2017) declaration that human capital remains the primary antecedent of structural and relational capital, emphasising that pragmatic human capital ensures a versatile organisational structure and robust business processes, which are fundamentals for effective employee performance. Similarly, Mubarik et al. (2018) averred that human capital creates invaluable value in the enterprise owing to its implicit and explicit aspects, which makes it influence other organisational assets in the generation of financial and non-financial returns. In this way, human capital is core for the generation of the required products and services necessary for effective performance and required competitiveness. The finding is in tandem with Saad et al. (2021)'s position that firms in the knowledge economy must perpetuate idea creation

by the employees as the main source of competitive edge, necessitating organisational focus on employee recruitment, development and retention. They held that talent management for organisational intellectual capital is key as it makes it paramount to attract, develop, motivate, value and retain human capital, which is crucial for the development of robust structural capital and effective relational capital, required for both employee and organisational performance.

The finding pointedly confirms the need for organisational pursuit of enhanced capacity in the entrenchment of intellectual capital. In this way, alignment of human capital management with performance objectives becomes a fundamental feature of organisational strategy, and such firms attain development of robust structural capital and effective relational capital, which enable enhanced competitiveness. The study has confirmed the positive influence of intellectual capital on employee performance. The finding was exposed to the moderating effects of KMI. Table 11 gives correlation results for KMI with EP.

Table 11: Correlation Analysis between KMI and Employee Performance

		Performance	KMI	
Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
KMI	Pearson Correlation	.569**	1	
	Sig. (2-tailed)	0.000		

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

Findings in Table 11 showed that KMI and employee performance have a positive and moderately strong relationship ($r=0.569$, $p<0.05$), depicting that a change in KMI leads to a change in employee performance in the same direction. This confirmed Masa'deh et al. (2019)'s assertion that

culture and technology have positive and significant relationships with employee performance; with further observation that adjustments to such KMI aspects as appropriate work design, leadership support and effective communication potentially influence employee

performance. Furthermore, the outcome supported Karungani and Ochiri's (2017) findings that suitable ICT infrastructure: enhances communication and task execution efficiency; promotes effective customer care; and enriches monitoring and control; concluding that appropriate ICT infrastructure: enables supply chain efficiency; facilitates company information flow; eliminates unnecessary costs, reduces transaction costs; and enables timely delivery. The

current study confirms the positive influence of KMI on employee performance.

Regression Analysis Outcome

Regression analysis to test research hypotheses and establish a statistical link between the variables was conducted, towards explaining the statistical relationship between the variables (Triola, 2021) and improving the study's capacity to draw meaningful conclusions. Tables 12, 13 and 14 provide the regression outcomes.

Table 12: Model summary for Intellectual Capital (IC) moderated by KMI

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	df1	df2
1	.543a	0.295	0.287	0.49905	0.295	1	92
2	.601b	0.361	0.359	0.47865	0.066	2	90
a Predictors: (Constant), IC							
b Predictors: (Constant), IC-KMI, KMI-IC							

The findings showed that the intellectual capital R square (IC and performance) was 0.295. With the moderating variable in the model (KMI), the R square improved from 0.295 to 0.361, indicating that the model's explanatory power improved by 0.066 (or 6.6%). This showed that KMI enhanced the relationship between IC and employee performance in food manufacturing firms in Nairobi. The model outcome of KMI positively moderating IC influence on employee performance, therefore, stands supported in literature and is consistent with Mukaro et al. (2023) findings that information, knowledge and other intangible assets depicted more value than physical commodities in the knowledge economy, making intellectual capital by far the most important factor influencing employee performance. This buttressed Momani et al.'s (2021) findings that showed a strong correlation

between intellectual capital and firm performance, with a positive and significant effect on firm performance. The synergistic tendency depicted by KMI is traceable to, among others, Eze et al. (2017)'s assertion that a suitable structure linked with the adequacy of organisational resources confers stability, resists stress and survives harsh business forces, making organisational structure a salient feature influencing employee performance. The enhancement of IC effect on employee performance by KMI is further supported by Abualoush et al. (2018), who posit that effective information technology systems enhance the valuable role of knowledge on employee creativity, expertise, skills and ability in discharging tasks and generating new knowledge, thereby enhancing employee performance. The model was exposed to ANOVA analysis, and the outcome is presented in Table 13 for illustration.

Table 13: ANOVA for Intellectual Capital Moderated by KMI

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	9.57	1	9.57	38.427	.000b
	Residual	22.913	92	0.249		
	Total	32.483	93			
2	Regression	11.618	3	3.873	16.705	.000c
	Residual	20.865	90	0.232		
	Total	32.483	93			
a Dependent Variable: performance						
b Predictors: (Constant), Intellectual Capital						
c Predictors: (Constant), IC_KMI, KMI_IC						

The ANOVA results imply that the model used to explain the moderating effect of KMI on the relationship between intellectual capital and employee performance is a good fit; as supported by the calculated F_{cal} of 16.705 and p-value of

0.000 ($F_{cal}=16.705 > F_{crit}=2.68$ and $p < 0.05$), depicting that the IC_KMI model can significantly predict employee performance. The regression test was then done, and the outcome is presented in Table 14 for illustration.

Table 14: Regression Coefficients for Intellectual Capital Moderated by KMI

Model		Unstandardised Coefficients		Standardised Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	2.359	0.305		7.723	0.000
	IC	0.483	0.078	0.543	6.199	0.000
2	(Constant)	2.113	0.786		2.687	0.009
	IC	0.23	0.079	0.258	2.902	0.009
	KMI	0.30	0.131	0.359	2.286	0.003
	KMI_IC	0.019	0.009	0.023	2.047	0.002
a Dependent Variable: performance						

From the findings, the positive coefficient for the interaction term (0.019) suggests that as KMI improves, the impact of IC on employee performance increases. The p-value ($0.002 < 0.05$) indicates this interaction is statistically significant, confirming that KMI moderates the relationship between IC and employee performance in food manufacturing firms in Nairobi. This means that with effective IC, employees can effectively utilise KMI, leading to higher employee performance. It is for this reason that organisations invest in such IC aspects as employee training, technology and processes, leveraging these to foster performance. Relatedly, Chen and Nonaka (2022) held that organisational focus on knowledge, skills, networks, values, intellect and talent confer capability to employees for performance

enhancement, making IC indispensable, among strategies for employee performance optimisation and organisational competitiveness.

CONCLUSION AND RECOMMENDATIONS

Conclusion: The study concluded that both IC had statistically significant positive impact on employee performance in KEBS, confirming that IC can be used to influence employee performance. The study further revealed that KMI catalyses with synergy, IC influence on employee performance. The study concludes that KMI had a significant moderating effect on the relationship between IC and employee performance in KEBS. The IC triple pillars performed in descending order of structural, relational and human capital, respectively. Robust KMI facilitates comprehensive utilisation of IC



and stimulates employee performance effectiveness.

Recommendations: The study had a raft of recommendations for both IC and KMI. The head of human resources should particularly ensure enhanced mainstreaming of employee participation in decision-making and problem-solving, and ensure sufficient exposure of employees to industry trends and professional practices. On relational capital, the head of marketing must undertake enhancement in the integration of customer service concerns and the enhancement of stakeholder strategic collaborations. Similarly, heads of marketing and ICT ought to provide a framework that enables capture, collation and analysis of customer concerns and communication of solutions, in an integrated fashion for optimal effectiveness. The heads of marketing, research, and development should formulate and ensure implementation of policies that aptly identify and

engage strategic partners for symbiotic collaborations that guarantee sustained mutual gains. These enhancements would trigger marked improvements in employee performance. Concerning KMI, the head of human resources should undertake measures to eliminate impediments to cultural suitability and adopt mechanisms for cultural improvements, such as building trust, a team approach to issues and organisational learning for performance. Similarly, the head of human resources ought to institute measures that reorient existing organisation structures to obliterate: negative effects on communication; hindrance to team building; and features decimating employee motivation; aspects impeding employee creativity; and factors jolting career progression. Joint efforts between the head of human resources and ICT are necessary for corrective actions on poor adoption and effective utilisation of technology.

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