Intellectual Capital Development and Employee Performance among Manufacturing Firms in Edo State, Nigeria

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Abstract
The impact of intellectual capital development on worker performance in manufacturing companies in Edo State, Nigeria, was investigated in this study. The three dimensions of intellectual capital included the research objectives. The theoretical underpinnings of the study include Gittell's relational coordination theory and Chester Barnard's system theory. A survey research design was employed in the study. All three thousand one hundred and sixty-four (3164) workers from nine (9) significant manufacturing enterprises in Edo State made up the study's population. There were 180 employees in the sample. A questionnaire was used as the data collection tool. The reliability results yielded a coefficient of 0.802(80.2%) for employee performance; 0.715 (71.5%) for human capita; 0.810(81.0%) for structural capital; and 0.70(70%) for relational capita. Data was analysed using Pearson correlation coefficient (PCC) under 5% level of significance. From the result, all three dimensions of intellectual capital development had a positive and significant influence on employee performance. The study recommended that manufacturing companies should invest more in knowledge through training and development programs, particularly in the present information economy in order to improve employee performance.

Keywords: Employee performance, human capital, intellectual capital, relational capital and structural capital.

Introduction
It is acknowledged that intellectual capital is a valuable intangible asset that gives businesses a competitive edge. Though its subjective character prevents it from being recorded on an organisation's financial accounts, the majority of organisations now view intellectual capital as eternal wealth. To increase employee potential and competency, corporate organisations spend on training and skill development, which raises intellectual capital levels. In the age of knowledge-based economies, organizations must have intangible resources and competencies to thrive in a changing business environment (Chen & Nonaka, 2022).

Intellectual capital (IC), according to Xu and Li (2019), can improve worker performance at work and add value for businesses. IC is made up of knowledge-related intangible assets that

improve organisational performance and spur innovation (Ozgun et al., 2022). IC is the collection of collective knowledge, information technology, experience, collaboration, employee contact, and copyrights that can generate organisational value (Alrowwad et al., 2020). It consists of three parts: relational capital (RC) (formal and informal relationships between employees and with customers), structural capital (SC) (organisational capabilities, information systems, and databases), and human capital (HC) (talent, education, and experience of employees) (Farzaneh et al., 2022).

Due to market uncertainties, shorter product life cycles, rapid information technology advancements, and rising demand, modern firms work in a complex environment with worldwide difficulties (Kim, 2020). Under these conditions, employee performance has emerged as a crucial prerequisite for achieving sustainability, survival, and growth (Peiró et al., 2020), thus underscoring the critical importance of intellectual capital. Indeed, employee performance (EP) describes the level of ability of an individual to perform a specific task (Swanson et al., 2020). Therefore, improving employee performance plays a significant role in turning workers' actions into productive services that boost organisational competitiveness (Abdelwahed et al., 2023). This is particularly true for Nigeria's manufacturing sector, which is dealing with high operating costs brought on by high energy costs, globalisation, importation, exchange rate devaluation, and low demand due to low customer disposable income.

The marketplace is becoming more and more competitive as globalisation occurs. Due to rising productivity, product quality, and market shares of both domestic and foreign competitors, manufacturing companies are also under a lot of pressure to succeed in the marketplace. Investigating intellectual capital qualities that enable value creation and extraction for an organisation through the use of knowledge inherent in organisational staff, infrastructure, and relationships is essential for manufacturing enterprises in Nigeria, and particularly in Edo State, to thrive. This is consistent with Sardo et al.'s (2018) suggestion that in order for an organisation to survive in a competitive ecosystem, pathways connecting IC and employee performance must be identified. According to Castro et al. (2019), IC is all of an organisation's skills, expertise, culture, procedures, intellectual property, and interpersonal networks that provide value, assist the organisation in achieving its objectives, and give it a long-term competitive advantage in the face of difficult obstacles. This made it necessary for this study to investigate how IC affects worker performance using manufacturing firms in Edo State as a case in point.

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Statement of the Research Problem

Intellectual assets are now more important than traditional ones for gaining a competitive edge in the modern business world. The process of globalisation and growing advancements in fields like computing, telecommunications, and production technology are to blame for this predicament (Osinski et al., 2017). All of these changes point to a fresh perspective and understanding of employees and organisational performance, particularly in the manufacturing sector, which powers any economy. These profound and ongoing changes have caused the world economy to change from an industrial to a knowledge economy, where businesses and employees seek to increase their value and competitiveness by focusing on developing their intangible knowledge assets as vital success factors.

Because of its diverse, pervasive, and dynamic nature of the world, intellectual capital has emerged as the primary tool in the knowledge economy for helping employees and organisations differentiate themselves from rivals. Numerous studies on IC and its impact on employee performance have been published in the literature (Fedoce et al., 2015; Mendoza, 2017;

Ojoh & Ibegbulem 2020; Villegas, et al., 2017). However, there appears to be little research on manufacturing companies in Edo state, which makes it imperative for this study to bridge this gap.

Objectives of the Study

The main purpose of the study is to determine the influence of intellectual capital development on employee performance among manufacturing firms in Nigeria. Specifically, the study's objectives are to examine:

i. influence of human capital (HC) on employee performance (EP) in manufacturing firms.
ii. influence of structural capital (SC) on employee performance (EP) in manufacturing firms.
iii. influence of relational capital (RC) on employee performance (EP) in manufacturing firms.

Hypotheses

The following hypotheses guided the study:

i. Human capital does not significantly influence employee performance in manufacturing firms.
ii. Structural capital does not significantly influence employee performance among manufacturing firms.
iii. Relational capital does not significantly influence employee performance in manufacturing firms.

Conceptual Review

Although the term "intellectual capital" (IC) has been used in numerous studies to identify intangible assets (Basri, 2015), there is no universally recognised word for it. Nonetheless, it was decided that human capital, structural capital, and relational capital are its most crucial elements (Martín-de-Castro, et al, 2011). Intellectual capital, according to Castro et al. (2019), is all of an organisation's skills, knowledge, culture, procedures, intellectual property, and interpersonal networks that provide value, assist it in achieving its objectives, and give it a long-term competitive advantage.

Human capital (HC), relational capital (RC), and structural capital (SC) are the three primary components of intellectual capital that have been recognised in the literature (Ahmad et al., 2022). The information, skills, technical competence, experience, attitude, commitment, wisdom, and capacities that people possess and utilize are referred to as human capital (Bontis et al., 2015). Employees' ingrained knowledge aids them in carrying out their duties as well as absorbing and producing new information that benefits the company (Ozgun et al., 2022). According to Pasamar et al. (2019), HC is the primary component of intellectual capital, making it the most significant asset of the company. It also adds to organizational productivity and creates value for the company. It can produce creative ideas and increase the organization's innovation, thus generating organizational value, which raises customer satisfaction and loyalty (Khalique et al., 2018).

According to Ganguly et al. (2019), relational capital (RC) is a measure of the quality of relationships as well as the capacity to foster partner satisfaction, trust, and employee and consumer loyalty. It also describes how friendships and respect grow between people and affect how they behave (Ozgun et al., 2022). Through cooperation, trust, and information sharing, it can enhance organisational learning, which in turn boosts the organisation's capacity for innovation (Liu et al., 2022). According to Akhavan & Hosseini (2016), RC is a useful resource that comes from the network of connections between firms and their personnel. This information serves as a foundation for collaboration and a means of knowledge exchange inside an organisation since it is

ingrained in the social relationships and networks between people, organizations, and social units (Bontis et al., 2015).

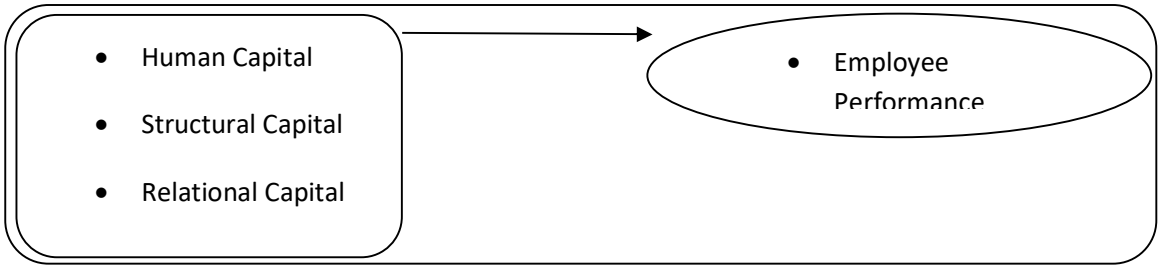
According to Farzaneh et al. (2022), structural capital (SC) is the knowledge that is kept in and utilised by the organisation's systems, processes, manuals, capabilities, databases, hardware, software, trademarks, images, copyrights, and patents. It involves creating formal protocols and managerial processes for information storage, going beyond people and their interactions (Kucharska, 2022). SC is associated with the processes and organisational structure that facilitate workers' productivity and persist within the company even after workers leave (Bontis et al., 2015). As a result, the organisation owns this stock of knowledge, which comprises information technology, corporate culture, and explicit knowledge used for problem-solving and innovation (Ozgun et al., 2022).

Employee performance refers to the outcomes and accomplishments attained at work. Maintaining plans while aiming for outcomes is referred to as performance. The performance of an individual or an organisation is heavily influenced by all of the organisation's policies, practices, and design elements, even if performance appraisal is the core of performance management (Anitha, 2014). As a crucial indicator of the organisation, performance demonstrates how successfully a process's actions or results accomplish a particular objective. Employee performance is important for businesses to increase productivity and obtain a competitive edge (Qalati et al., 2022). It can be described from the standpoint of actions or results. According to Abdelwahed et al. (2023), the behaviour aspect describes an employee's actions at work and is pertinent to organisational objectives, whereas the outcome element describes the effects and outcomes of the employee's actions and can be impacted by environmental conditions.

Task performance and contextual performance are the two primary categories of employee performance (Al-Husseini, 2023). The technical abilities and knowledge required to generate goods and services through the organisation's fundamental technical processes, or when employees fulfil their job criteria and accomplish their task goals, are referred to as task performance. The actions associated with this sort of work performance, according to Abdelwahed et al. (2023), include organisational members carrying out their assigned tasks and responsibilities as outlined in their job description.

Conversely, the literature refers to contextual performance as citizenship behaviour (Motowidlo & Van Scotter, 1994). In the organisational, social, and psychological contexts where the primary technical activities are carried out, it encompasses the behaviours of the personnel (Qalati et al., 2022). According to research, job devotion and interpersonal facilitation make up contextual performance (Borman & Motowidlo, 1997). It includes activities that boost morale, promote teamwork, eliminate obstacles to performance, preserve positive working relationships, and assist colleagues in carrying out their task-oriented job duties (Scotter, quoted in Al-Husseini, 2023). Employees could take steps to safeguard the company from possible issues and provide suggestions for how to make it run more smoothly as part of contextual performance. Persistence, effort, compliance, and self-discipline are contextual performance behaviours that are predicted to boost managers' and employees' effectiveness, according to Peiró et al. (2020).

Conceptual Framework



Source: Researcher's Schematic Framework

It is widely accepted that intellectual capital (IC) is an essential resource that raises worker productivity and organisational effectiveness. Relational, structural, and human capital are some of the factors that affect an organisation's success across a wide range of industries. According to both performative and ostensive perspectives on intellectual capital, higher levels of intellectual capital are associated with better employee performance in the public and private sectors, as measured by performance perceptions and financial ratios (Phusavat et al, cited in Masoumeh & Hani, 2023). In industrial settings, intellectual capital has been shown to positively affect a number of company performance metrics, such as financial performance, customer satisfaction, business processes, and learning and growth (Hashim et al, cited in Masoumeh & Hani, 2023). Managers and regulators may use this information to create an environment that promotes and benefits from intellectual property in order to gain a competitive edge and ensure the long-term success of enterprises.

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Theoretical Framework

Chester Barnard's (1938) system theory and Gittell's (2011) relational coordination theory serve as the foundation for this work. According to the system theory, organisations should consider all relevant factors in their internal and external environments when searching for answers to organisational challenges rather than focusing on just one strict solution. This is due to the fact that they all work together to accomplish organizational goals and objectives.

According to the relational coordination theory, task integration is achieved by simple communication and relation. High-performance outcomes are driven by these mutually reinforcing relationships and communication linkages, which together provide the foundation for coordinated collective action. Critical performance outcomes are driven by relational coordination theory. Direct communication between front-line employees and networks that transcend functional silos at the customer contact point is how relational coordination is accomplished. Thus, relationship coordination enhances a work process's performance by strengthening the bonds between individuals who carry out various tasks in that process (common objectives, mutual respect, and shared knowledge), which results in better communication. Employee and organisational performance will improve as a result of participants' ability to manage their inter-dependencies more directly, seamlessly, and with fewer redundancies, lapses, errors, and delays.

These theories are appropriate for this study because they suggest that organisations seeking to solve organisational issues should consider all important factors in both the internal and external environments (human, structural, and relational capital) rather than focusing on a single, inflexible solution. Additionally, Bontis et al. (2015) pointed out that the interplay between IC's several components, rather than just one, is what gives it its synergistic value.

Empirical Literature

Etim et al. (2024) examined the impact of intellectual capital on listed manufacturing companies' financial performance on the Nigerian exchange group for the fiscal years 2015 through 2023. The study used an ex post facto research design. The population and sample consisted of thirty-three (33) quoted manufacturing companies in Nigeria that were spread across two sub-sectors on the Exchange floor as of December 31, 2023. The fixed effect regression model was found to be appropriate for analysis using the Hausman test. Findings showed that HC, RC and SC were statistically significant and positive drivers of the financial performance of manufacturing firms in emerging economies.

Al-Husseini (2023) investigated how organisational learning functions as a mediator between employee performance and intellectual capital (human, relational, and structural). 438 managers from Iraqi banks participated in the study. Structured equation modelling was used to create a model and evaluate conditional hypotheses. The findings showed that human, relational, and structural capital positively impact employee performance.

Masoumeh & Hani (2023) examined the impact of organisational learning as a mediating factor in the relationship between intellectual capital and employee performance. A descriptive-survey design was employed in the investigation. Tehran's SMEs made up the research's statistical population. There were 228 businesses in the sample. Questionnaires were utilised to gather data. Findings revealed that employee performance is positively and significantly impacted by organisational learning and intellectual capital.

The impact of intellectual capital on worker performance in a subset of Edo State manufacturing bottling enterprises was assessed by Ojoh & Ibegbulem (2020). In particular, the study aimed to ascertain the nature of the relationship between human capital and product innovation, the relationship between organisational capital and creative operations, and the degree to which social capital influences the manufacturing bottling companies' signal of competence. A survey research design was applied. Data were gathered using 291 structured questionnaire items. To test the hypotheses, Pearson product-moment correlation was employed. The results showed that employee performance toward knowledge productivity for the accomplishment of corporate goals is positively and significantly influenced by human capital.

Methodology

Survey research design was used. The population of the study consisted of all the 3164 employees of 9 major manufacturing companies in Edo State (Okomu Oil Palm plc; Presco plc; Guinness Nigeria plc.; Nigerian Bottling Company (NBC); 7up Bottling Company; Creamella Food Ltd.; Becca’s Foods; Niki Manufacturing Company Ltd. and Ellah Lakes) as at December 2025, (Human resource departments of various firms). The sample size was 180 employees, 20 from each firm, who were purposively selected from the firms. The data was exclusively sourced through a structured questionnaire designed by the researcher and validated by experts in the Department of Business Administration, Delta State University, Abraka, Delta State.

The instrument had five sections. Section A covered the biodata of the respondents, while sections B to E covered items related to the research questions/hypotheses. Each variable in the research questions/hypotheses had 6 items in each section, totalling 24 items. The reliability was established using Cronbach Alpha statistical method which yielded a coefficient of 0.802(80.2%) for employee performance; 0.715 (71.5%) for human capita; 0.810(81.0%) for structural capital; and 0.70(70%) for relational capital. The heads of the department of the human resource department assisted in the administration and retrieval of the instrument. Pearson correlation

coefficient (PCC) was used for the analysis. The study adopted 5% level of significance, and a conclusion was made based on the probability values (P-value).

Results

180 questionnaires were administered and 162 were retrieved after careful monitoring and supervision.

Table 1: Bio-Data Result

Variable		Frequency	%
Sex:			
	Female	101	62.35
	Male	61	37.65
Age:			
	21-30	17	10.49
	31-40	72	44.44
	41-50	38	23.46
	51-60	35	21.61
Educational Qualification			
	SSCE	29	17.90
	OND/NCE	50	30.86
	HND/First Degree	68	41.98
	Master/MBA	15	9.26
	Ph.D	nil	nil

The result in Table 1 revealed that out of the 162 employees who returned their questionnaire in the survey, 101, representing 62.35%, were females, while 61, representing 37.65%, were males. This indicated that there were more female employees in the survey than male employees.

On age, the ages bracket of 21-30 were 17 representing 10.49%, those within the age bracket of 31-40 had 72 representing 44.44%, 41-50 years of age had 38 representing 23.46%, and 51-60 years of age had 35 representing 21.61% This indicated that most of the employees surveyed were within the age bracket of 31-40 years of age.

On educational qualification, SSCE had 29, representing 17.90%, those with OND/NCE had fifty (50, representing 30.86%, those with HND/First degree had 68, representing 41.98%, those with masters/MBA had 15, representing 9.26% and Ph,D had nil. This meant that they are more HND/First degree holders.

Hypotheses Testing

Hypothesis One: Human capital does not significantly influence employee performance in manufacturing firms.

Table 2: **Pearson Correlation Coefficient Result**

		HC	EP
HCD	Pearson Correlation	1	.762**
	Sig. (2-tailed)		.000
	N	162	162

Table 2, results showed a coefficient of 0.762 (76.2%) and a p-value of 0.000. With this, the study accepted the hypothesis that human capital significantly influences employee performance in manufacturing firms. This means that significant human capital development influences employee performance in the manufacturing firms.

Hypothesis Two: Structural capital does not significantly influence employee performance among manufacturing firms.

Table 3: Pearson Correlation Coefficient Result

		SC	EP
SC	Pearson Correlation	1	.745**
	Sig. (2-tailed)		.000
	N	162	162

Table 3 results showed a coefficient of 0.745 (74.5%) and a p-value of 0.000. With this, the study accepted the hypothesis that structural capital development significantly influences employee performance in manufacturing firms. This means that significant structural capital development influences employee performance in the manufacturing firms in Edo State, Nigeria.

Hypothesis Three: Relational capital does not significantly influence employee performance in manufacturing firms.

Table 4: **Pearson Correlation Coefficient Result**

		RC	EP
RC	Pearson Correlation	1	.701**
	Sig. (2-tailed)		.000
	N	162	162

Table 4 results showed a coefficient of 0.701 (70.1%) and a p-value of 0.000. With this, the study accepted the hypothesis that relational capital significantly influences employee performance in manufacturing firms. This means that significant relational capital development influences employee performance in the manufacturing firms.

Discussion

Using Edo State as a case study, the study examined employee performance and intellectual capital development in industrial enterprises. According to the findings, employee performance is positively and significantly impacted by all three aspects of intellectual capital development - human, structural, and relational. This is due to the fact that it immediately enhances both in-role and extra-role behaviours and acts as a significant accelerator for competence and creativity. However, effective time management, organisational learning, and employee engagement all contribute to the success of intellectual capital expansion.

This result is consistent with that of Etim et al. (2024), who looked at the effect of intellectual capital on the financial performance of listed manufacturing companies on the Nigerian exchange group for the fiscal years 2015 through 2023. They found that HC, RC, and SC were statistically significant and positive drivers of the financial performance of quoted manufacturing firms in emerging economies such as Nigeria. Additionally, the results of this study are consistent with those of Al-Husseini (2023), who examined the role of organisational learning as a mediator between employee performance and intellectual capital and found that employee performance is positively impacted by human, relational, and structural capital.

In the same vein, the findings of this study align with those of Masoumeh & Hani (2023), who examined the impact of organisational learning as a mediating factor in the relationship between intellectual capital and employee performance and revealed that employee performance is positively and significantly impacted by organisational learning and intellectual capital. Also, the findings of this study align with those of Ojoh & Ibegbulem (2020), who assessed the impact of intellectual capital on worker performance in a subset of Edo State manufacturing bottling enterprises and showed that employee performance toward knowledge productivity for the accomplishment of corporate goals is positively and significantly influenced by human capital.

Conclusion and Recommendation

The impact of the three elements of intellectual capital on worker performance was investigated in this study. Scholars and professionals have shown a great deal of interest in intellectual capital. The significance of intellectual capital in creating and maintaining an organisation's competitive advantage through employee performance has been emphasised by research and theory in this field. Similar to earlier research (Etim et al., 2024; Masoumeh & Hani, 2023; Ojoh & Ibegbulem, 2020), this study discovered that intellectual capital has a positive and significant impact on employee performance, confirming the critical role of intellectual capital dimensions in employee performance, particularly organisational performance in the constantly changing and competitive manufacturing sector. Based on the findings, the study recommends the following:

i. To boost employee performance, manufacturing companies should invest more in knowledge through training and development programs, particularly in the present information economy.
ii. Manufacturing firms should invest more in structural capital through technology in order to enhance employee productivity.
iii. Lastly, for manufacturing firms in Edo state, to remain competitive, they should foster innovation, build trust, loyalty and knowledge sharing with customers and other external stakeholders.

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