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IMPROVING ORGANISATIONAL DECISIONS ON HUMAN RESOURCES AND EMPLOYMENT RELATIONS MANAGEMENT WITH BIG DATAAND ARTIFICIAL INTELLIGENCE: A CASE STUDY OF IBOM AIR, AKWA IBOM STATE, NIGERIA

BY

DR. NATHANIEL A. UDOH
Department of Industrial Relations and Personnel Management
Faculty of Social and Management Sciences
RitmanUniversity,
Ikot Ekpene,
Akwa Ibom State, Nigeria.

ABSTRACT

In an era of rapid technology advancement and increasing expectations for institutional responsibility, the strategic use of data-driven technologies in human resource management has emerged as an essential component of contemporary governance and organisational success. This research examines the utilisation of Big Data and Artificial Intelligence (AI) to enhance human resources and employment relations management, with a specific focus on Ibom Air, the inaugural airline of Akwa Ibom State. This research analyses Ibom Air's implementation of a digital HR framework that incorporates AI algorithms for workforce analytics, performance monitoring, and dispute resolution, based on field observations, internal reports, and structured interviews with HR staff. The system collects comprehensive employee data, including biometric attendance, productivity logs, assessment records, and training comments, and processes it in real time to inform managerial choices. Findings reveal significant outcomes: a notable reduction in staff disputes, enhanced fairness in appraisal processes, improved predictive planning for talent acquisition, and greater transparency in addressing employee concerns. These changes have not only improved operational efficiency but also deepened trust and engagement between staff and management, key indicators of healthy industrial relations.The paper argues that embedding Big Data and AI in HR practice is not merely a technical upgrade, but a strategic imperative that reinforces empathy, equity, and accountability in organisational leadership. It recommends deliberate investments in digital infrastructure, staff capacity-building, and ethical data governance, especially within emerging economies where human-centred innovation can catalyse long-term institutional growth.This presentation contributes to the ongoing discourse on sustainable public sector transformation in Africa and offers practical knowledge for both policymakers and practitioners striving to create resilient, people-focused institutions through intelligent technology.

Keywords: Employment Relations, Big Data, Artificial Intelligence, Organisational Decision-Making, Ibom Air and Digital Transformation.

INTRODUCTION

In an age marked by tremendous technology progress and increased demands for accountable and ethical organisational governance, the strategic incorporation of Big Data and Artificial Intelligence (AI) into Human Resource Management (HRM) is imperative. It is no news that the Fourth Industrial Revolution (4IR) has initiated a transition towards technology-driven, intelligent decision-making systems that transform how businesses manage personnel, address workplace challenges, and achieve strategic objectives (Chilunjika et al., 2022). In this changing environment, HR practices are progressively (though

inconsistently) utilising predictive analytics, real-time performance assessment, and AI-driven interventions for more objective, efficient, and equitable decision-making (Ncube, 2024; Sangu et al., 2024). Also, some research studies have been conducted to study the use of AI in business organizational activities such as marketing, supply chain and operations management, and HRM activities have been touched upon briefly in some research studies, (Habeeb, Ayomide & Babatunde, 2025).

Big Data analytics provide HR professionals with capabilities to mine large-scale employee data, ranging from attendance and productivity logs to training feedback, to extract actionable insights that cannot be captured through traditional sampling approaches (Angrave et al., 2016; McAfee & Brynjolfsson, 2012; Marasi et al., 2020). These tools facilitate proactive workforce planning, reduce hiring and appraisal bias, and enhance recruitment accuracy (Rangaiah, as cited in Majam, 2021; OECD, 2019). Simultaneously, AI-driven HR systems (often embedded within Electronic-HRM (e-HRM) frameworks), automate routine tasks, offer personalised employee experiences, and support real-time performance and sentiment analytics (Wikipedia, 2025; Sangu et al., 2024). Importantly, this technological integration is not merely operational; it reshapes the very nature of organisational decision-making. Deep learning and AI have the capacity to augment managerial cognition, enabling more nuanced, creative, and evidence-informed HR leadership (Shrestha et al., 2020).

Despite these promising developments, the implementation of Big Data and AI in HRM, particularly within emerging economies, is not without notable challenges. Common barriers include infrastructural limitations, data governance and privacy concerns, scarce technical skills among HR practitioners, and the risks of algorithmic bias (OECD, 2019; Majam, 2021; Chilunjika et al., 2022). For AI applications, ethical dimensions such as fairness, transparency, and employee trust are equally critical, particularly as these systems influence career trajectories, performance assessments, and dispute resolutions (Robert et al., 2020; Aizenberg & van den Hoven, 2020).

This study examines how Ibom Air, the flagship airline of Akwa Ibom State, Nigeria, has operationalised the potential of Big Data and AI within its HR and employment relations functions. By implementing a digital HR architecture that integrates biometric attendance systems, real-time productivity tracking, AI-driven performance analytics, and structured feedback mechanisms, the organisation aims to enhance operational efficiency while fostering fairness, transparency, and employee trust. Drawing from observational data, internal HR documentation, and structured interviews with HR staff, this research explores the dual outcomes of technological innovation and human-centredorganisational culture.

STATEMENT OF PROBLEM

Organizations increasingly face challenges in making timely and effective decisions in human resources and employment relations. Decision-making methods often rely on intuition and limited data, leading to inefficiencies and errors. Ibom Air, like many organizations, struggles to optimize workforce management and employee relations due to complex HR dynamics. The rapid growth of data and technological innovations offers opportunities through Big Data and Artificial Intelligence (AI). However, there is limited research on how these technologies can be effectively applied to enhance HR decisions in the Nigerian aviation sector. This study seeks to investigate how Big Data and AI can improve HR and employment relations management at Ibom Air.

Research Objectives

i. To investigate how Big Data and AI have been integrated into HR and employment relations management at Ibom Air.

ii. To assess the effects of these technologies on organisational outcomes such as dispute resolution, appraisal fairness, and talent planning.
iii. To derive implications for policymakers and leaders in emerging economies aiming to foster empathetic, accountable, and technology-enabled institutional governance.

Research questions

i. How are Big Data and AI currently integrated into Ibom Air's HR and employment relations management?
ii. What impacts have these technologies had on dispute resolution, staff engagement, and decision-making?
iii. What lessons can be drawn for other organisations in emerging economies?

Null Hypotheses

The following hypotheses were created to guide this study:

i. **H01:** The integration of Big Data and AI in Ibom Air's HR management does not significantly reduce workplace disputes.
ii. **H02:** The adoption of Big Data and AI tools does not significantly improve employees' perceptions of fairness and transparency in performance appraisals.
iii. **H03:** AI-enabled predictive workforce planning does not significantly improve talent acquisition and staffing efficiency.
iv. **H04:** The use of Big Data and AI in HR processes does not significantly enhance employee trust and engagement with management.
v. **H05:** There is no significant relationship between the adoption of Big Data/AI-driven HR systems and overall organisational decision-making effectiveness.

Significance of the Study

By focusing on Ibom Air, a government-owned entity serving as a model of public sector transformation, this research contributes to the growing discourse on sustainable institutional innovation in Africa. It foregrounds how technology, when aligned with capacity building and ethical frameworks, can support not only administrative efficiency but also deeper relational trust and organisational equity. Lessons from this case have relevance for government agencies, public-sector enterprises, and managerial leaders navigating technology adoption in low-resource settings.

Literature Review

Big Data in Human Resource Management

According to McAfee and Brynjolfsson (2012), Big Data refers to datasets so large and complex that they require advanced analytical tools and techniques to uncover hidden patterns and generate actionable insights. In the context of human resource management (HRM), Big Data allows organisations to gather and process vast volumes of employee-related informationfrom recruitment metrics to performance indicators, in real time. As argued by Minbaeva (2018), the ability to integrate these datasets into decision-making frameworks enhances organisational responsiveness and accuracy in workforce planning.

In Africa, Big Data adoption in HRM remains in its nascent stage, often constrained by infrastructure limitations and digital literacy gaps. Nevertheless, studies such as those by Marler and Boudreau (2017) demonstrate that, when effectively deployed, Big Data analytics improves talent acquisition strategies, reduces turnover, and supports evidence-based policy interventions. This underpins the view that Big Data is not merely a tool for operational efficiency but a driver of strategic transformation in HR functions.

Artificial Intelligence in Employment Relations

Artificial Intelligence (AI) in HR encompasses a range of applications, from algorithm-driven recruitment

to natural language processing for employee sentiment analysis. As opined by Tambe, Cappelli, and Yakubovich (2019), AI enables organisations to automate routine HR tasks while simultaneously uncovering nuanced insights into employee behaviour and organisational climate. AI-driven analytics can, for example, identify predictors of workplace conflict or disengagement before they escalate.

However, as noted by Leicht-Deobald et al. (2019), the integration of AI in employment relations raises concerns over transparency, bias, and fairness. Echoing this, Dastin (2018) cautions that algorithmic decision-making, if not carefully governed, can perpetuate existing inequalities in recruitment and appraisal. This tension between technological potential and ethical responsibility is particularly salient in contexts such as Nigeria, where regulatory frameworks for AI use in HR are still emerging.

Case Studies in African Organisational Contexts

According to Boateng (2019), African enterprises adopting AI and Big Data often face a "dual challenge" of modernising their HR systems while aligning them with local cultural and labour dynamics. In Ghanaian aviation, for instance, data-driven scheduling and predictive maintenance have been linked to improved workforce stability and reduced industrial disputes. Similarly, Chigada and Madzinga (2021) observe that South African firms using predictive analytics for workforce management have reported improved transparency in promotion decisions and dispute resolution.

These findings resonate with the experience of Ibom Air, where the integration of AI and Big Data into HR processes has not only optimised operational efficiency but also strengthened trust between staff and management. The literature suggests that such cases exemplify a broader shift towards human-centred digital transformation, in which technology serves as an enabler of fairness, accountability, and collaborative workplace cultures.

Methodology

Research Design

This study adopts a descriptive case study design to examine how Big Data and Artificial Intelligence (AI) influence organisational decision-making in human resources and employment relations management at Ibom Air. As Yin (2018) notes, the case study approach is appropriate for exploring contemporary phenomena within their real-life context, especially where the boundaries between the phenomenon and the context are not clearly evident. The design facilitates an in-depth investigation of both technological and human factors in the airline's HR operations.

Population and Sampling

The study population comprised all permanent and contract staff of Ibom Air, including employees from the human resources, operations, and corporate services departments. According to Saunders, Lewis, and Thornhill (2019), purposive sampling is suitable when participants are selected for their direct relevance to the research problem. Consequently, the sample consisted of 60 staff members whose roles involved interaction with HR processes enhanced by Big Data and AI tools. This ensured the inclusion of both managerial and non-managerial perspectives.

Data Sources and Collection Methods

Both primary and secondary data were utilised. Primary data were obtained through semi-structured interviews and questionnaires designed to capture participants' experiences, perceptions, and attitudes towards the integration of Big Data and AI in HR decision-making. The interviews allowed for the exploration of nuanced issues such as trust, transparency, and ethical concerns.

Secondary data were drawn from company reports, HR analytics dashboards, operational records, and relevant industry publications. These sources provided a complementary factual basis for triangulating

findings from the primary data. As argued by Creswell (2014), combining multiple data sources enhances the credibility and validity of research conclusions.

Data Analysis

Qualitative data from interviews were analysed using thematic analysis, guided by Braun and Clarke's (2006) six-phase framework. This involved familiarisation with the data, generating initial codes, identifying themes, reviewing themes, defining and naming them, and producing the report.

Quantitative data from questionnaires were analysed using descriptive statistics (frequencies, percentages, means, and standard deviations) to summarise participants' responses. Where applicable, inferential statistics such as chi-square tests were applied to examine associations between respondents' demographic characteristics and their perceptions of Big Data and AI applications in HR. Statistical analyses were performed using SPSS version 25.

Ethical Considerations

The study adhered to ethical principles of informed consent, confidentiality, and voluntary participation. Participants were assured that no personally identifying information would be disclosed, and that data collected would be used solely for academic purposes. Ethical clearance was obtained from the relevant institutional review board prior to data collection.

FINDINGS AND DISCUSSION

Research Question One

How are Big Data and AI currently integrated into Ibom Air's HR and employment relations management?

The study revealed that Ibom Air has implemented a digital HR framework designed to integrate multiple sources of employee-related data into a centralised analytics system. This framework incorporates biometric attendance systems, digital performance assessment tools, training feedback modules, and AI-enabled workforce planning dashboards. The AI algorithms embedded in the system provide predictive insights, such as identifying potential skill gaps and forecasting future staffing needs based on operational patterns.The adoption of these tools reflects what Marler and Boudreau (2017) describe as the *strategic analytics shift* in HR, where data and AI algorithms become central to decision-making rather than supplementary aids.

Table 1 – Overview of Big Data and AI Tools Adopted by Ibom Air

Tool/Feature	***Function in HR***	***Outcome/Benefit***
Biometric Attendance	Tracks punctuality and absence	Reduced disputes over working hours
Digital Performance Assessment	Scores staff on objective metrics	Increased fairness in appraisals
AI Workforce Planning Dashboard	Predicts staffing needs	Improved scheduling and reduced last-minute hiring costs
Training Feedback Module	Monitors training impact	Better skills gap identification

Source: Field Work, 2025

Participants consistently noted that the adoption of these tools marked a departure from traditional, paper-based HR management. The technology-driven processes were perceived as faster, more accurate, and less susceptible to bias which are attributes that align with prior research on AI's capacity to improve decision-making accuracy in HR functions (Meijerink et al., 2021).

Research Question Two

What impacts have these technologies had on dispute resolution, staff engagement, and decision-making?

Reduction in Workplace Disputes

Hypothesis 1 (H1): *The integration of Big Data and AI in Ibom Air's HR management significantly reduces workplace disputes compared to pre-implementation levels.*

A recurring finding from interviews with HR managers was a significant reduction in employment-related disputes following the introduction of the AI-enabled HR system. Disputes related to attendance, overtime claims, and performance evaluations decreased, with participants attributing this to the transparent and verifiable nature of digital records. This finding supports the assertion by Bondarouk and Brewster (2016) that digital HR systems enhance fairness and accountability, particularly in contexts where workplace conflict resolution is data-dependent.

Table 2 – Change in HR-Related Disputes (Pre- and Post-Implementation)

Type of Dispute	*Before AI Integration (Year 1)*	*After AI Integration (Year 2)*	*% Change*
Attendance disputes	54 cases	32 cases	–40.7%
Overtime claims disputes	37 cases	21 cases	–43.2%
Performance appraisal grievances	29 cases	18 cases	–37.9%
Total	120 cases	71 cases	–40.8%

Source: Field Work, 2025

Furthermore, quantitative analysis of HR records indicated a 40.8% decline in formal grievance cases over an 18-month period post-implementation. A chi-square test confirmed that the reduction in disputes was statistically significant ($p < 0.05$), thereby supporting the hypothesis while the alternative is rejected. This aligns with the broader discourse on how data-driven HR processes can strengthen employment relations by reducing ambiguity in decision-making (Stone et al., 2015).

Improved Fairness in Performance Appraisal

Hypothesis 2 (H2): *The adoption of Big Data and AI tools has a significant positive effect on employees' perceptions of fairness and transparency in performance appraisals*

The study found a marked improvement in employee perceptions of fairness in performance appraisal processes. Staff respondents emphasised that performance scores were now derived from measurable metrics, such as completed assignments, punctuality records, and training participation, rather than subjective managerial judgement.

Table 3 – Employee Perceptions of Fairness and Transparency in HR Processes

Survey Item	*Pre-Implementation Score (%)*	*Post-Implementation Score (%)*	*Change (Percentage Points)*
Performance appraisals are fair	**58%**	**81%**	**+23**
HR policies are applied consistently	**64%**	**86%**	**+22**
HR decisions are transparent	**61%**	**84%**	**+23**

Source: Field Work, 2025

Statistical analysis (paired mean comparisons) indicated that the observed improvements were significant ($p < 0.05$), and as such, the hypothesis which stated that the adoption of Big Data and AI tools has a significant positive effect on employees' perceptions of fairness and transparency in performance appraisalswas accepted while the alternative was rejected. This results mirror Kehoe and Collins (2017), who argue that performance systems based on objective data elicit higher trust and legitimacy. This shift mirrors the arguments of Kehoe and Collins (2017), who observe that performance management systems underpinned by objective data tend to elicit greater employee trust. At Ibom Air, such objectivity was further enhanced by AI algorithms that flagged performance anomalies for HR review, reducing the possibility of oversight or personal bias.

Predictive Workforce Planning and Talent Acquisition

Hypothesis 3 (H3): *AI-enabled predictive workforce planning significantly improves talent acquisition and staffing efficiency at Ibom Air.*

One of the most strategic benefits identified was the predictive capacity of the AI system in workforce planning. HR managers reported that predictive analytics allowed them to forecast staffing shortages and surpluses months in advance, enabling timely recruitment or redeployment.

Secondary HR records showed a reduction in last-minute hiring costs and improved scheduling efficiency. A chi-square test confirmed a significant reduction in urgent/emergency hires post-implementation ($p < 0.05$). This provides empirical support for **H3** and resonates with of Minbaeva (2018), who argues that predictive analytics in HR facilitates proactive decision-making and strategic alignment between workforce supply and organisational demand. In the context of Ibom Air, this proactive stance has improved scheduling efficiency, reduced last-minute hiring costs, and strengthened succession planning for key operational roles.

Enhanced Employee Engagement and Trust

Hypothesis 4 (H4): *The use of Big Data and AI in HR processes significantly enhances employee trust and engagement with management.*

Beyond operational metrics, the study found that employee trust in management had improved since the deployment of Big Data and AI tools. Interviewees described a greater sense of transparency, as data relevant to their performance and career progression was accessible on demand. The correlation analysis therefore, showed a positive and significant relationship ($r = 0.61$, $p < 0.01$) between perceptions of transparency and reported trust levels. Thematic analysis of interviews confirmed that transparency fostered by AI tools was the foundation of improved trust. Thus, **H4** is supported.

This is consistent with the view of Parry and Battista (2019), who suggest that transparent HR analytics can bridge trust gaps between staff and management, especially in organisations undergoing digital transformation. For Ibom Air, the perception of fairness and clarity in HR processes has contributed to higher engagement scores in internal employee satisfaction surveys.

Discussion in the Context of Organisational Decision-Making

Hypothesis 5 (H5): *There is a significant positive relationship between the adoption of Big Data/AI-driven HR systems and overall organisational decision-making effectiveness at Ibom Air.*

The integration of Big Data and AI in Ibom Air's HR management exemplifies how technology can elevate organisational decision-making from reactive to predictive and prescriptive levels.

The regression analysis showed that adoption of AI-enabled tools (transparency, predictive analytics, appraisal fairness) explained 47% of the variance in decision-making effectiveness ($R^2 = 0.47$, $p < 0.01$).

This evolution aligns with the Resource-Based View (RBV), which posits that strategic resources, such as advanced HR analytics, can create sustained competitive advantage when they are valuable, rare, inimitable, and well-organised (Barney, 1991).

Moreover, the case of Ibom Air underscores the argument that digital transformation in HR is not merely a technical exercise, but a socio-technical process that blends technology with cultural shifts in trust, equity, and accountability (Bondarouk et al., 2017). In emerging economy contexts, where resource constraints can hinder large-scale system deployment, the success of Ibom Air suggests that targeted, well-managed investments in digital HR can yield significant organisational dividends.

Research Question Three

What lessons can be drawn for other organisations in emerging economies?

The Ibom Air case offers several transferable lessons for other organisations in emerging economies seeking to leverage Big Data and AI in human resources and employment relations management:

1. Prioritise Transparent Communication – Technology alone does not guarantee trust. As evidenced by the post-implementation survey, Ibom Air coupled digital tools with clear policy communication, ensuring employees understood how data-driven decisions were made.
2. Start with High-Impact Pain Points – By targeting dispute-heavy areas (attendance, overtime claims, and performance appraisals), the airline achieved quick, visible wins that built momentum for wider adoption.
3. Invest in Training for Both Staff and Managers – Successful deployment required that all stakeholders, not just HR professionals, understood the systems' functionalities and limitations.
4. Adapt Systems to Local Contexts – AI algorithms and data models were customised to reflect local employment laws, cultural expectations, and operational realities, preventing friction with labour unions and regulators.
5. Use Data for Predictive, Not Just Reactive, Decision-Making – The predictive staffing dashboard reduced last-minute hiring costs and improved workforce allocation — a lesson particularly relevant for resource-constrained organisations in volatile markets.

These lessons present the broader applicability of Ibom Air's approach and provide a framework for other organisations in emerging economies to replicate or adapt according to their unique circumstances.

Summary of Hypothesis Testing

Table 4 – Summary of Hypothesis Testing

Hypothesis	*Statement*	*Result*
H1	Integration of Big Data and AI significantly reduces workplace disputes.	**Supported** (40.8% reduction in disputes; χ^2 $p < 0.05$)
H2	Adoption of Big Data and AI tools improves employees' perceptions of fairness and transparency in performance appraisals.	**Supported** (Fairness +23%, Transparency +23%; paired test $p < 0.05$)
H3	AI-enabled predictive workforce planning significantly improves talent acquisition and staffing efficiency.	**Supported** (Reduced last-minute hires and costs; χ^2 $p < 0.05$)
H4	Use of Big Data and AI in HR processes enhances employee trust and engagement with management.	**Supported** (Positive correlation between transparency & trust: $r = 0.61$, $p < 0.01$)

H5	Adoption of Big Data/AI-driven HR systems is positively associated with organisational decision-making effectiveness.	**Supported** (Regression model explained 47% variance; $R^2 = 0.47$, $p < 0.01$)

CONCLUSIONS

This study set out to examine how Big Data and Artificial Intelligence (AI) can improve organisational decision-making in human resources and employment relations management, using Ibom Air in Akwa Ibom State, Nigeria, as a case study. The findings demonstrate that the deliberate integration of digital HR systems, underpinned by AI algorithms, can transform workforce analytics, streamline performance monitoring, and enhance dispute resolution processes. The research was guided by five hypotheses, all of which were supported by empirical evidence, and together, the findings confirm that the deliberate integration of digital HR systems underpinned by AI algorithms can transform workforce analytics, streamline performance monitoring, and enhance dispute resolution processes. Importantly, these outcomes were not merely technical but were reinforced by leadership's commitment to clear communication, capacity-building and ethical data governance.

Through real-time processing of biometric attendance, productivity logs, appraisal scores, and training feedback, Ibom Air achieved measurable reductions in staff disputes, improved fairness and transparency in appraisals, and more accurate predictive planning for talent acquisition. Importantly, these outcomes were not purely technological; they were reinforced by leadership's commitment to clear communication, capacity-building, and ethical data governance.

The research reinforces the position that embedding Big Data and AI in HR practice is not merely an operational enhancement, but a strategic imperative. In emerging economies, where institutional resources may be limited, the ability to use intelligent systems for people-centred decision-making can significantly contribute to sustainable growth, stronger labour relations, and greater organisational resilience.

RECOMMENDATIONS

Based on the study's findings, the following recommendations are proposed:

1. **Invest in Digital Infrastructure –**Organisations, particularly in emerging economies, should prioritise robust digital HR platforms capable of integrating AI functionalities and real-time analytics.
2. **Strengthen Capacity-Building Initiatives** – Continuous training for HR professionals, line managers, and employees is essential to maximise the benefits of AI-enabled decision-making tools.
3. **Adopt Ethical Data Governance Frameworks** – To maintain trust, organisations must establish clear policies on data privacy, usage, and employee consent, aligning with both local regulations and international best practice.
4. **Implement Phased Rollouts Targeting High-Impact Areas** – Organisations should begin with HR processes most prone to disputes or inefficiencies, using early successes to build confidence in the system.
5. **Foster Cross-Sector Knowledge Sharing** – Governments, professional bodies, and private organisations should encourage knowledge exchange to accelerate the adoption of AI and Big Data in HR, while tailoring approaches to local contexts.
6. **Link Technological Adoption to Organisational Culture Change** – Technological tools must be embedded within a culture of transparency, inclusivity, and accountability to achieve lasting improvements in employment relations.

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