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Artificial Intelligence Adoption in Broadcast Content Development: Empirical Evidence from Radio Stations in South-East Nigeria

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ABSTRACT

Artificial Intelligence (AI) is transforming global media production, yet adoption in South-East Nigeria remains limited due to infrastructural, skill-based, and institutional constraints. Despite global advancements, evidence from the region shows predominantly analog content workflows and minimal integration of AI-based automation, analytics, or editing tools, creating a widening digital gap. This study addresses the lack of empirical, region-specific investigations by evaluating how operational challenges, content development patterns, and institutional perceptions influence AI adoption among radio stations. The objectives were to assess the impact of skills, infrastructure, funding, and policy gaps on AI uptake; examine content development practices; determine whether AI improves workflow efficiency and quality; and identify institutional barriers using Correspondence Analysis. Data were collected from 360 practitioners and nine key informants across 63 radio stations. Analytical methods included chi-square tests, descriptive statistics, and Correspondence Analysis. Results show significant associations between operational challenges and AI adoption ($\chi^2 = 141.47$, $p = 0.000$) and between AI use and improved content development ($\chi^2 = 119.81$, $p = 0.000$). The study concludes that sustainable AI integration requires stronger policies, capacity building, and localized AI tools. It recommends coordinated investments, regulatory support, and continuous training to enhance innovation and competitiveness within the broadcast sector.

Keywords: Artificial Intelligence, Broadcast Content, Correspondence Analysis, Media Production, Radio Stations

1. Introduction

Artificial Intelligence (AI), a field of computer science that enables machines to perform tasks requiring human intelligence, has become central to the transformation of global media production, distribution, and audience engagement. In technologically advanced economies, broadcast organisations increasingly deploy AI to automate repetitive newsroom operations, accelerate content workflows, and enhance audience targeting (Carlson, 2015; Dörr, 2016). Leading global media organisations such as Reuters, The Washington Post, and the Associated Press (AP) routinely apply algorithmic journalism to generate earnings reports, sports recaps, and data-driven stories at scale, with minimal human intervention (Carlson, 2015). In Europe, MittMedia produces hyper-local news using AI, while Deutsche Welle integrates AI-based subtitling to support rapid translation and localization (Graefe, 2016; Volanschi, 2021). Asian media innovators offer similar examples: China's Xinhua News Agency developed AI-powered news anchors for continuous broadcasting, and South Korea's Seoul Broadcasting System (SBS) piloted AI-assisted video editing and music generation for drama production. In North America, Adobe's AI engine Sensei supports automated video classification and editing, significantly reducing production time (Manovich, 2019). Collectively, these innovations highlight AI's transformative potential for content generation, personalization, and workflow efficiency through Natural Language Generation (NLG), recommendation systems, and predictive analytics (Broussard, 2018).

Despite these global advancements, scholarly work also points to growing structural and ethical challenges. Ogola (2023) highlights issues ranging from algorithmic bias to unequal access to data infrastructures across Africa. El Erafy (2023) emphasises AI's role in content creation, moderation, and recommendation through Natural Language Processing (NLP) and computer vision, but notes that empirical assessments of AI's effect on newsroom performance remain limited. Similarly, Ali and Hassoun (2019) examine AI's potential in combating misinformation while warning that most available evidence is conceptual rather than empirical, leaving a gap in measurable performance benchmarks. Systematic reviews by Sonni et al. (2024) further note that although AI-assisted content personalization is rising globally, there is insufficient country-level validation from developing nations.

In Africa, AI adoption in newsrooms remains emergent. Ogola (2023) provides a continental mapping that identifies persistent challenges such as talent shortages, infrastructural limitations, and the absence of local AI tools. Ezeaka and Umennebuaku (2024) stress the need for culturally grounded and inclusive AI that supports community-centred development communication. In the Nigerian context, Ogbuoshi (2021) argues from a technology-determinism perspective that infrastructure and policy alignment are critical for digital transitions, while Ogbodo et al. (2025) examine how Natural Language Processing (NLP) and automated layout systems are gradually entering Nigerian newspaper workflows. Empirical studies remain few, yet notable work by Anyanwu and Iheonye (2024) involving 399 practitioners in South-East Nigeria reveals early patterns of AI usage in content automation

and personalised audience engagement, though significant skill and infrastructure deficits persist. Ukwuru et al. (2023) echo these findings, identifying chronic equipment shortages and inadequate staff training in Nigeria's public broadcast sector. Recent work by Aronu et al. (2025) specifically examined the South-East Nigeria broadcast environment and confirmed that content development practices remain largely analog despite increasing global digitalisation. Their findings show that institutional barriers such as staff hesitancy, absence of training, and weak policy frameworks hinder AI adoption. This underscores the need for deeper empirical investigation into adoption dynamics, organisational readiness, and the relationships between practitioner perspectives and institutional challenges in the region.

Although Artificial Intelligence (AI) is revolutionising broadcast content development globally, radio stations in South-East Nigeria have not fully embraced these technologies. Existing studies show that content development across the region remains predominantly analog, with minimal integration of AI-based tools for automation, editing, localization, or audience analytics (Aronu et al., 2025). Practitioners report significant constraints, including inadequate skills, unreliable infrastructure, limited funding, and the absence of supportive institutional policies (Anyanwu & Iheonye, 2024; Ogola, 2023). While global media organisations increasingly rely on Natural Language Generation (NLG), predictive analytics, and AI-enabled newsroom automation, local broadcasters continue to rely on manual workflows that reduce efficiency, limit creativity, and weaken competitiveness. Moreover, empirical evidence on how these challenges shape AI adoption, influence content practices, or affect broadcast workflow outcomes in the Southeast region remains scarce. Without systematic analysis, the region risks widening technological gaps and missing opportunities for digital innovation in broadcasting.

The literature highlights rapid global progress in Artificial Intelligence (AI) driven journalism but exposes notable gaps in developing contexts, particularly Nigeria. Empirical studies examining AI adoption in Nigerian radio stations remain limited, and few works provide quantitative evidence linking operational challenges, such as inadequate skills, weak infrastructure, limited funding, and policy gaps, to actual adoption behaviours. Existing research rarely applies mixed-methods approaches that integrate statistical modelling with practitioner insights, nor does it assess how AI influences workflow efficiency, content quality, or production processes within local broadcasting environments. Furthermore, no region-specific studies map institutional challenges to practitioner perceptions using analytical techniques like Correspondence Analysis.

This study is crucial because it provides evidence that supports technological adoption, aids regulatory bodies such as the National Broadcasting Commission in designing policies, and guides radio stations in planning training and infrastructure upgrades. Academically, it contributes region-specific data missing from the literature, while socially, improved AI integration can enhance content quality, strengthen audience engagement, and reduce misinformation. Accordingly, the study aims to assess how operational challenges affect AI adoption, examine existing content development patterns, evaluate AI's impact on workflow and quality, analyse institutional and perceptual barriers, and offer practical recommendations for strengthening AI integration in South-East Nigerian radio broadcasting.

1.1 Conceptual Framework

The framework adopted for this study is anchored on how operational challenges, content development practices, and institutional/perceptual factors shape Artificial Intelligence (AI) adoption and ultimately influence content development outcomes in radio broadcasting.

1. Independent Variables

a. Operational Challenges

- Inadequate skills
- Poor infrastructure
- Limited funding
- Absence of policy support

b. Content Development Practices

- Creative practices
- Diverse content
- Production routines

c. Institutional and Perceptual Factors

- Awareness and information gaps
- Attitudes toward AI
- Localization concerns
- Organizational readiness

These variables influence the extent to which radio stations adopt and integrate AI tools into their workflows.

2. Mediating Variable

AI Adoption

- Use of AI tools for automation
- Personalization and audience analytics
- Editing and production enhancement
- Workflow optimization

AI adoption moderates the relationship between the independent variables and content outcomes.

3. Dependent Variable

Content Development Outcomes

- Improved workflow efficiency
- Enhanced content quality
- Sustainable production
- Better audience engagement

Operational challenges, institutional perceptions, and current content practices all influence the likelihood and extent of AI adoption. AI adoption, in turn, improves the efficiency and quality of broadcast content development.

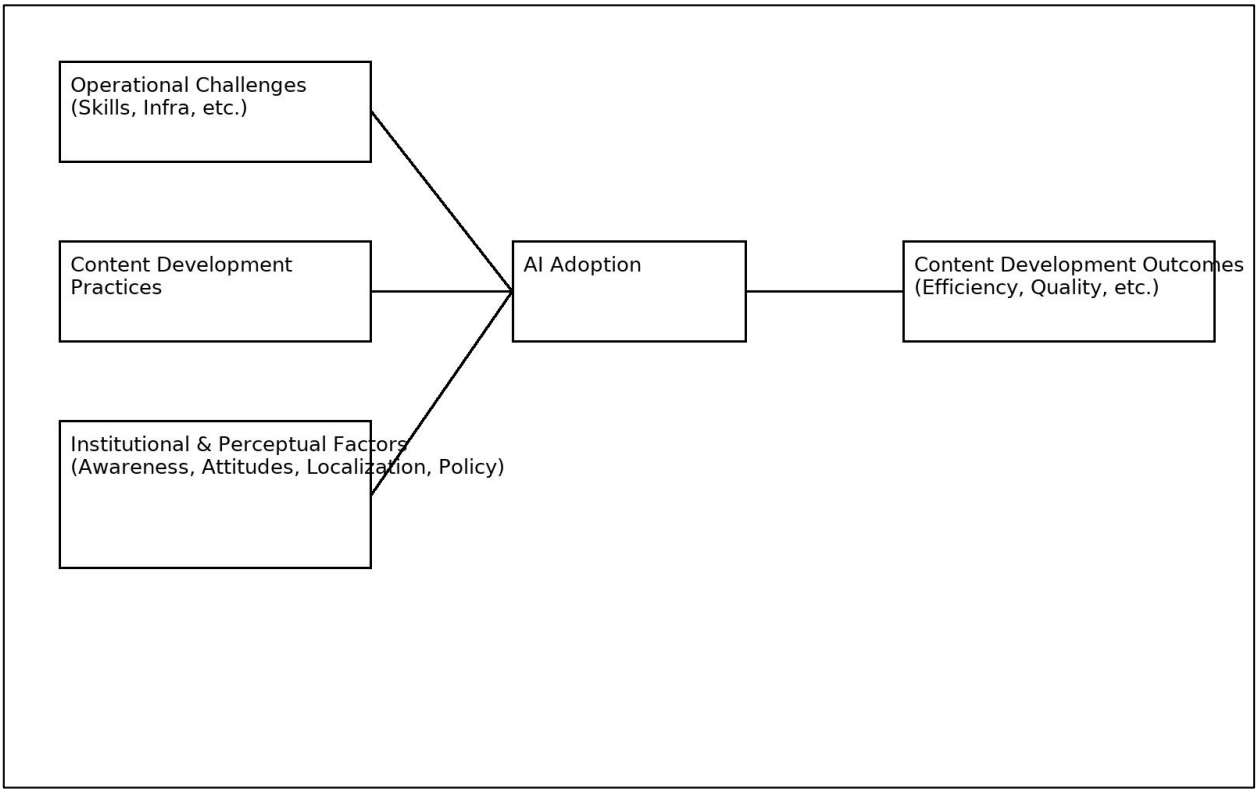

Figure 1: Conceptual Framework for Determinants and Outcomes of Artificial Intelligence Adoption in Broadcast Content Development

The framework presented in Figure 1 illustrates how operational constraints, existing content practices, and institutional perceptions shape Artificial Intelligence adoption in radio broadcasting. Adoption acts as a mediating force that enhances content development outcomes, improving efficiency, quality, and overall workflow performance across broadcast organisations.

2.0 Methodology

This study adopted a quantitative survey to obtain an understanding of the determinants and effects of Artificial Intelligence (AI) adoption in broadcast content development.

2.1 Study Area and Population

South-East Nigeria was selected due to its vibrant and rapidly evolving broadcast landscape, characterised by high audience engagement and growing technological adoption. The study population comprised radio content creators across all 63 state-owned, federal, and privately operated radio stations licensed by the National Broadcasting Commission (NBC) within the five South-Eastern states.

2.2 Sample Size and Sampling Procedure

Given that the exact number of practitioners across these stations was unknown, Cochran's (1977) formula for determining sample size in large or indeterminate populations was applied. The recommended minimum sample size of 384 respondents was adopted, and 360 valid questionnaires were returned, representing a strong response rate for analysis.

2.3 Data Collection Instruments

Two instruments were developed for data collection:

i. a structured questionnaire for the quantitative survey, and

ii. a semi-structured interview guide for the key informant interviews.

The questionnaire captured practitioners' experiences with AI, content development processes, and institutional challenges.

2.4 Sampling Technique

A convenience sampling approach was used in administering the questionnaires to practitioners available during the researcher's visits to selected radio stations. While non-probabilistic, this technique was appropriate given the variability of staff schedules and ensured broad representation across operational departments.

2.5 Data Analysis

Quantitative data were analysed using descriptive statistics and chi-square tests of independence to examine relationships among content practices, institutional challenges, and AI adoption. Correspondence Analysis (CA) further complemented the statistical tests by mapping the association patterns between respondents' sentiments and institutional challenges hindering AI adoption. The combination of statistical and qualitative procedures strengthened the validity of the findings and enhanced the interpretive depth of the study.

3. Results and Discussion

3.1 Results of the Analysis

This section presents empirical evidence from chi-squared tests and correspondence analysis to examine the statistical relationships between broadcast content practices, practitioner perspectives, and institutional challenges as they relate to the adoption of Artificial Intelligence (AI).

3.1.1 Analysis of AI Adoption Dynamics in Broadcast Content Development

H_{01}: Challenges such as inadequate skills, poor infrastructure, and limited funding do not significantly affect AI adoption in content development among radio stations in South-East Nigeria.

H_{11}: Challenges such as inadequate skills, poor infrastructure, and limited funding significantly affect AI adoption in content development among radio stations in South-East Nigeria

Table 1: Chi-Square Test Assessing the Influence of Operational Challenges on AI Adoption in Content Development

Test Statistic	Value
Chi-squared (χ^2)	141.47
Degrees of Freedom	4
p-value	0.000

The chi-square result ($\chi^2 = 141.47$, df = 4, $p = 0.000$) presented in Table 1 shows a significant association between operational challenges and AI adoption. Since $p < 0.05$, the null hypothesis is rejected, indicating that inadequate skills, poor infrastructure, and limited funding meaningfully influence AI uptake. This underscores the need for targeted capacity building and investment..

H_{02}: There is no significant pattern in current content development practices among radio stations in South-East Nigeria.

H_{12}: There is a significant pattern in current content development practices among radio stations in South-East Nigeria.

Table 2: Chi-Square Test Evaluating Patterns in Content Development Practices among Radio Stations

Test Statistic	Value
Chi-squared (χ^2)	62.526
Degrees of Freedom	4
p-value	0.000

The chi-square statistic ($\chi^2 = 62.526$, df = 4, p = 0.000) in Table 2 reveals a significant pattern in content development practices. With $p < 0.05$, the null hypothesis is rejected, confirming structured and non-random content practices across stations. This consistency implies shared editorial routines and potential opportunities for standardized training and quality improvement.

H_{03}: AI adoption does not significantly improve content development processes among radio stations in South-East Nigeria.

H_{13}: AI adoption significantly improves content development processes among radio stations in South-East Nigeria.

Table 3: Chi-Square Test Assessing the Impact of AI Adoption on Content Development Processes

Test Statistic	Value
Chi-squared (χ^2)	119.81
Degrees of Freedom	12
p-value	0.000

The chi-square statistic ($\chi^2 = 119.81$, df = 12, $p = 0.000$) in Table 3 demonstrates a significant relationship between AI adoption and improved content development processes. Since $p < 0.05$, the null hypothesis is rejected. This indicates that AI meaningfully enhances workflow efficiency and content quality, underscoring the need for broader AI integration across radio stations.

3.1.2. Correspondence Analysis of Institutional Challenges of AI Adoption

Table 4. Principal Inertias (Eigenvalues)

Dimension	Value	Percentage
1	0.0523	62.87%
2	0.0229	27.58%
3	0.0079	9.55%

The result in Table 4 presents the principal inertias (eigenvalues) obtained from Correspondence Analysis (CA) on practitioners' responses to institutional challenges in AI (Artificial Intelligence) adoption. Dimension 1 accounts for 62.87% of the total inertia, meaning it explains the majority of the variability in the data related to perceptions about AI localization, lack of information, mechanical perceptions of AI, and absence of government policy. It likely captures the most dominant pattern of association among response categories. Dimension 2 explains 27.58% of the variation, revealing a secondary but significant structure in the data, possibly related to nuanced divides between support and uncertainty in AI readiness. Dimension 3, while accounting for only 9.55%, may capture residual variation, including outlier perceptions or ambiguous responses.

The top two dimensions together explain 90.45% of the total variability, indicating that a 2-dimensional plot (e.g., biplot or map) would accurately represent the key patterns in the data. Most of the interpretive power is concentrated in Dimension 1, suggesting that certain challenges (e.g., policy absence and poor localization) are systematically related to specific stakeholder perceptions (e.g., uncertainty, disagreement). The findings highlight specific dimensions of institutional weakness that need targeted interventions, such as improving AI-related communication strategies and forming inclusive policy frameworks.

Table 5. Row Coordinates and Statistics

Response	Mass	ChiDist	Inertia	Dim. 1	Dim. 2
Strongly Agree	0.0750	0.3333	0.0083	-0.5555	-0.1286
Agree	0.4875	0.1516	0.0112	0.1042	-0.9723
Uncertain	0.2375	0.1745	0.0072	0.1661	1.1062
Disagree	0.1625	0.2551	0.0105	0.8058	1.1642
Strongly Disagree	0.0375	1.1055	0.0458	-4.7874	0.8469

Table 5 presents the row statistics from the Correspondence Analysis (CA) of practitioners' responses to institutional challenges to Artificial Intelligence (AI) adoption in broadcasting. Each row represents a response category, with five key statistics: Mass (proportional weight of each response), ChiDist (chi-square distance from the centroid), Inertia (contribution to total variation), and coordinates along Dimension 1 and Dimension 2. "Agree" and "Uncertain" responses dominate in mass (0.4875 and 0.2375, respectively), indicating they are the most frequent. "Strongly Disagree," despite being the least common (mass = 0.0375), shows the highest ChiDist (1.1055) and Inertia (0.0458), meaning it is highly deviant from the average pattern and has an outsized impact on the association structure. Dimensional coordinates show that "Strongly Disagree" is an extreme outlier along Dimension 1, while "Disagree" and "Uncertain" cluster more along Dimension 2, suggesting nuanced divides in institutional skepticism or uncertainty. These findings imply that while moderate responses shape general opinion, polarized responses signal critical dissatisfaction or uncertainty, demanding attention in the development of AI-supportive institutional frameworks in broadcasting.

Table 6. Column Coordinates and Statistics

Category	Mass	ChiDist	Inertia	Dim. 1	Dim. 2
Lack_Info_AI	0.25	0.280495	0.019669	0.825689	-1.28045
Perception_AI_Mechanical	0.25	0.230882	0.013327	-0.06329	1.397361
AI_Localization_Concerns	0.25	0.240894	0.014507	0.848351	0.389316
Absence_Govt_Policy	0.25	0.377862	0.035695	-1.61076	-0.50623

Table 6 displays the column-level output from the Correspondence Analysis (CA) conducted on institutional factors influencing Artificial Intelligence (AI) adoption in broadcast content development. The columns represent four challenge categories: *Lack of Information about AI (Lack_Info_AI)*, *Perception of AI as Mechanical (Perception_AI_Mechanical)*, *AI Localization Concerns (AI_Localization_Concerns)*, and *Absence of Government Policy (Absence_Govt_Policy)*. Each has equal Mass (0.25), indicating they contribute equally in terms of frequency. However, ChiDist and Inertia reveal their relative contribution to data variance. *Absence of Government Policy* has the highest ChiDist (0.3779) and Inertia (0.0357), indicating it deviates most from the average and plays the largest role in explaining variation. *Lack of Information about AI* and *AI Localization Concerns* also shows notable influence along Dimension 1, with positive coordinates (0.8257 and 0.8484 respectively), suggesting they are closely associated with similar respondent sentiments. In contrast, *Perception of AI as Mechanical* loads strongly on Dimension 2 (1.3974), marking it as conceptually distinct. These results imply that policy-related barriers and structural information gaps are critical in shaping negative institutional perceptions, and targeted interventions in policy advocacy and localized AI training may significantly improve institutional acceptance and integration of AI technologies.

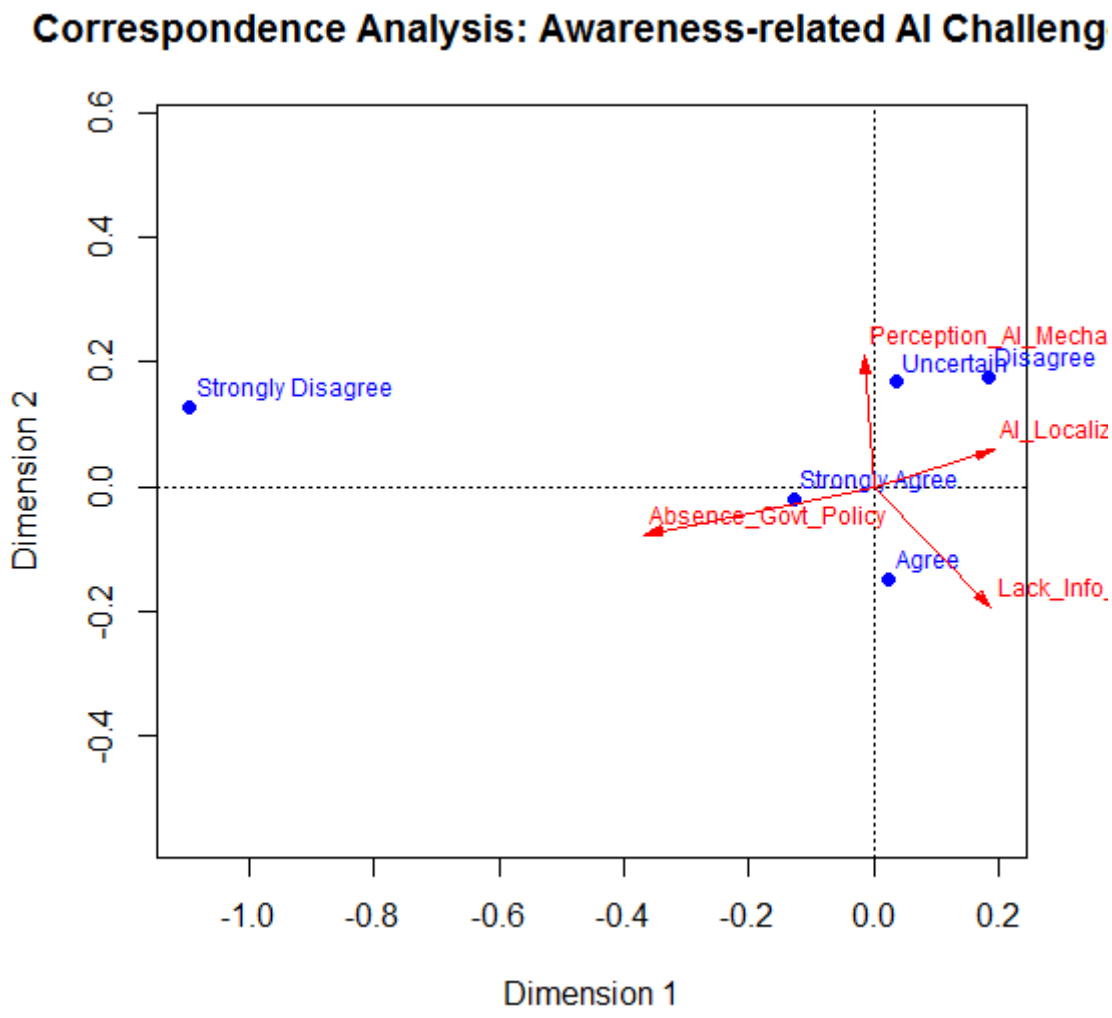

Figure 2: Correspondence Analysis Plot of Awareness-related Challenges and Sentiments on AI Adoption in Broadcasting Institutions

Figure 2 presents the Correspondence Analysis (CA) biplot that visually maps the relationship between respondent sentiments (in blue) and institutional awareness-related challenges (in red) affecting Artificial Intelligence (AI) adoption in broadcast content development. Along Dimension 1 (horizontal axis) and Dimension 2 (vertical axis), both rows (response categories such as Agree, Strongly Disagree) and columns (challenges like Lack of Information about AI, Absence of Government Policy) are plotted to reveal associations. Notably, Strongly Disagree is isolated to the far left on Dimension 1, indicating minimal alignment with any institutional challenge. Conversely, the vectors Lack of Information about AI and AI Localization Concerns point toward the lower-right quadrant, closely aligned with Agree and Strongly Agree, suggesting respondents who acknowledge these barriers also perceive them as relevant impediments to AI integration. Meanwhile, Perception of AI as Mechanical correlates more with Uncertain and Disagree responses along Dimension 2, signalling conceptual ambiguity or resistance. The relatively central clustering of Absence of Government Policy implies it is a broadly acknowledged concern across sentiment categories. In summary, the plot reveals that respondents with stronger agreement tend to perceive informational and localization issues as more pressing, suggesting that targeted education, training, and localized AI solutions could improve institutional readiness and positive reception of AI in broadcasting. The findings reveal that both individual perceptions and institutional limitations significantly shape AI adoption in broadcasting. This underscores the importance of addressing psychological, informational, and policy-related barriers through tailored capacity-building, strategic communication, and inclusive governance frameworks to foster responsible and sustainable AI integration.

3.2 Discussion of Results

The findings reveal strong and statistically significant relationships between operational constraints, content practices, and Artificial Intelligence (AI) adoption among radio stations in South-East Nigeria. The chi-square result showing that inadequate skills, poor infrastructure, and limited funding significantly affect AI uptake aligns with earlier observations by Anyanwu and Iheonye (2024) and Ogola (2023), who emphasized severe capacity and infrastructural deficits across African newsrooms. The significant pattern in content development practices further supports Aronu et al. (2025), who noted that the region's workflows remain predominantly analog, thereby constraining digital innovation. Likewise, the strong association between AI

adoption and improved workflow efficiency echoes global evidence from Carlson (2015), Graefe (2016), and Manovich (2019), who reported that AI enhances speed, accuracy, and content scalability in leading media organisations.

Correspondence Analysis reinforces that institutional barriers, particularly lack of information, localization concerns, and weak policy structures, shape practitioner perceptions, mirroring challenges highlighted by Ezeaka and Umennebuaku (2024) and Ogbuoshi (2021). These results imply that without targeted capacity-building, robust policy frameworks, and localized AI solutions, broadcasters may continue to lag behind global innovation trends. Strengthening skills, infrastructure, and regulatory support is therefore critical to enabling sustainable AI-driven transformation in Nigeria's broadcast sector.

4. Conclusion

The study demonstrates that Artificial Intelligence (AI) adoption in broadcast content development within South-East Nigeria is strongly shaped by operational constraints, institutional perceptions, and existing production practices. Significant associations between skills gaps, infrastructural deficits, funding limitations, and AI uptake underscore the structural fragilities that continue to impede digital transformation in the region. At the same time, evidence that AI adoption enhances workflow efficiency and content quality mirrors global trends and confirms the technology's potential value for local broadcasters. Correspondence Analysis further shows that policy gaps, poor localization, and inadequate awareness remain critical bottlenecks. In conclusion, the findings affirm that while AI presents meaningful opportunities for innovation, its integration requires deliberate institutional support and capacity reinforcement.

To accelerate AI adoption, policymakers, particularly the National Broadcasting Commission (NBC), should establish clear regulatory frameworks, promote AI literacy, and support investments in digital infrastructure. Radio stations should prioritise continuous staff training, strengthen organisational readiness, and adopt localized AI tools suited to the Nigerian broadcast environment. Partnerships between academia, technology providers, and media houses can foster sustainable capacity building and reduce resistance to innovation. Addressing institutional barriers such as absence of policy direction and information gaps will enhance broadcasters' confidence in AI technologies. Ultimately, coordinated action across policy, institutional, and organisational levels is essential to unlock AI's full potential and position the region's broadcast sector for global competitiveness.

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