

Beyond Digital Adoption: Mapping the Technological Transformation of State-Owned Television Broadcasting in Nigeria

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Abstract

The study examines selected state-owned television stations in Nasarawa, Plateau and Benue States to determine whether digital adoption has translated into deeper technological integration and transformation, the creative application and organisational implications of digital technologies, and the institutional, infrastructural and human-capital conditions that shape this transition. The study draws on Diffusion of Innovation Theory and the Technology-Organisation-Environment (TOE) framework. The two theories allow the study to examine both how digital technologies are adopted and the organisational and environmental conditions that determine how deeply those technologies become integrated into broadcasting practice. The study adopted a cross-sectional survey design. The population comprised broadcasting personnel in the selected state broadcast stations, using convenience sampling based on accessibility and willingness to participate. The study found a high level of digital technology adoption and integration across the selected state-owned television stations. The study also found that digital technologies were creatively applied to programme development, editing, promotion, faster production, improved content quality, easier distribution, and staff adaptation. The study further identified challenges of funding, electricity, training, internet connectivity, and maintenance as constraints. And concluded that Digital transformation in state-owned television broadcasting extends beyond the acquisition of digital equipment. It depends on how effectively technology becomes embedded in everyday production, content development, distribution, and professional practice, and recommended that State-owned television broadcasters should move beyond equipment acquisition towards sustained technological integration, continuous professional development in daily digital operations, by creating opportunities for staff to experiment with new digital formats and production approaches.

Keywords: technology; adoption; transformation; creativity; broadcasting

1. Introduction

The technological transformation of television broadcasting has moved beyond the replacement of analogue equipment with digital alternatives. Digital technologies have altered the organisation of media work by reshaping how content is gathered, produced, edited, stored, distributed and consumed across interconnected platforms. The emergence of online video, social media, mobile technologies and other networked platforms has expanded the boundaries of conventional broadcasting, requiring media organisations to develop new production practices, professional competencies and organisational arrangements.

Reyes-de-Cózar et al. (2022), in a systematic review of digital competencies in media organisations, establish that changes in news production, distribution and consumption have generated new profes-

sional roles and skills, indicating that digitalisation affects the structure of media work rather than merely the tools used to perform it. Similarly, Parkatti et al. (2022), based on interviews with journalists, conceptualise digital competence at individual, team and organisational levels and show that effective digital work depends not only on employees' technical capabilities but also on organisational support and opportunities for continuing learning. Technological transformation in television broadcasting can therefore be understood as a process through which digital technologies become embedded in production routines, professional practices, distribution systems and organisational decision-making. The distinction is consequential because the acquisition of digital technologies represents adoption, whereas transformation implies their effective integration into the wider operational and creative processes of a broadcasting organisation.

The Nigerian broadcasting sector provides an important context for examining this distinction because empirical studies demonstrate substantial digital adoption alongside continuing institutional and infrastructural constraints. Emwinromwankhoe and Ekharefo (2021), examining three broadcast stations in Edo State, found that ICTs had substantially influenced information gathering, programme production and editing, programme relay, display and storage, while inadequate training, unstable electricity, high technology costs and poor internet facilities remained significant challenges.

More recent evidence from Abuja indicates a similarly high level of ICT adoption and application. Jemila et al. (2025), studying Channels TV, NTA and FRCN, reported very high integration of ICTs in broadcast operations, particularly in news gathering and processing, and recommended continuing professional training and stronger institutional support. Alaekwe et al. (2025) also found among journalists in Imo State that digital technologies had improved news gathering, production speed and dissemination efficiency, although inadequate training, infrastructure and the cost of digital equipment continued to constrain their use. At the level of digital transition, Chike-Iyo et al. (2024) found that selected television stations in South-South Nigeria were preparing for digital broadcasting through the use of hybrid equipment and staff training, while Emenike (2024) identified financial limitations, inadequate technical expertise, insufficient digital equipment, poor infrastructure, regulatory delays, staff resistance and maintenance costs as significant barriers to digital migration in Asaba. These findings demonstrate that Nigerian broadcasters are not operating outside the digital environment. Rather, they show a sector in which technologies are being adopted and applied while the organisational conditions required for deeper integration remain uneven.

However, the existing evidence leaves an important analytical question insufficiently addressed. Much of the Nigerian literature has examined digital adoption, preparedness, migration, specific ICT applications or audience engagement as separate issues, rather than investigating technological transformation as a connected organisational process. For example, Apuke and Felix (2024) examined the adoption of digital platforms by Channels TV and NTA and found moderate audience engagement, with convenience, access to updates, and interactivity motivating digital use, while streaming difficulties, data consumption, and outdated content constrained engagement. Okaiyeto et al. (2025) similarly found moderate audience engagement with the social media platforms of Channels TV and NTA and identified slow loading, low streaming quality, high data consumption and outdated content as important limitations.

These studies provide useful evidence about the audience consequences of digital platforms, but they do not explain how the organisational systems, creative practices and technological capabilities within television stations produce or constrain those outcomes. Obaje and Inobemhe (2024) provide a broader account of Nigeria's digital innovation journey and identify economic, socio-political and

technical barriers to the fuller integration of digital technologies. Their industry-level analysis, however, does not provide a comparative station-level examination of how technological transformation occurs within state-owned television organisations operating under different institutional conditions. Likewise, studies of digital competence establish the importance of staff capabilities and organisational support, but do not sufficiently connect these factors with the extent of technology integration and creative application within state-owned television broadcasting.

Against this empirical and conceptual gap, the present study examines selected state-owned television stations in Nasarawa, Plateau and Benue States to determine whether digital adoption has translated into deeper technological integration and transformation. Specifically, it examines the extent of digital technology adoption and integration, the creative application and organisational implications of digital technologies, and the institutional, infrastructural and human-capital conditions that shape this transition. The comparative focus shifts the discussion from whether state-owned broadcasters have adopted digital technologies to the more consequential question of how deeply those technologies have become embedded in broadcasting practice and organisational transformation.

1 Literature review

1.1 Conceptual review

1.1.1 *Digital technology adoption in television broadcasting*

A television station does not become digital simply because it has digital equipment in its studios. The more fundamental question is whether the organisation has accepted the technology and incorporated it into its routine broadcasting activities. Rogers (2003) describes adoption as the decision to make full use of an innovation, placing adoption within a wider process through which organisations encounter, evaluate and accept new technologies. In broadcasting, this may involve the introduction and use of digital cameras, non-linear editing systems, computerised newsroom tools, digital archives, streaming platforms and social media applications.

The Nigerian broadcasting literature suggests that this process is already well underway. Emwinrom-wankhoe and Ekhareafu (2021) found that ICTs were being used extensively for information gathering, programme production, editing, relay and storage in selected broadcast stations in Edo State. Jemila et al. (2025) similarly reported high levels of ICT adoption and application among selected broadcast organisations in Abuja, particularly in news gathering and processing. Adoption, therefore, provides the starting point for understanding technological change in broadcasting. Yet, it does not tell us whether technologies have altered the way the station itself functions. That distinction leads to the broader question of **technological transformation**.

1.1.2 *Technological transformation in television broadcasting*

The difference between having technology and transforming through technology is central to understanding contemporary broadcasting. Vial (2019), drawing on a review of 282 studies, defines digital transformation as a process through which combinations of information, computing, communication and connectivity technologies produce significant changes in an organisation. Mergel et al. (2019) similarly distinguish transformation from simple digitisation and digitalisation by emphasising changes that extend across organisational processes, culture, products and relationships with

stakeholders. Transformation therefore involves a deeper restructuring of how an organisation performs its work.

Applied to television, technological transformation occurs when digital technologies become woven into production workflows, content distribution, newsroom routines, audience relationships and organisational decision-making. Verhoef et al. (2021) reinforce this distinction by identifying digitisation, digitalisation and digital transformation as progressively broader stages of technological change. This perspective is useful for the present study because it prevents digital transformation from being reduced to equipment acquisition or platform presence. The real issue is whether adopted technologies have changed the way state-owned television stations produce, distribute and organise broadcasting. Once technology becomes embedded in these processes, another dimension becomes visible: **how creatively the technology is being used**.

1.1.3 Creative application of digital technologies in television broadcasting

Digital technology has expanded the creative possibilities available to broadcasters. A camera, editing system, streaming platform or social media account does not produce innovation by itself. Its significance depends on what broadcasting professionals do with it. Creative application refers here to the purposeful use of digital capabilities to develop new or modified approaches to programme production, storytelling, content presentation, distribution and audience interaction.

Reyes-de-Cózar et al. (2022) show that digitalisation has expanded the competencies required for contemporary media work because journalists and media organisations must work across changing production and distribution environments. Parkatti et al. (2022) similarly found that digital competence operates across individual, team and organisational levels, suggesting that creative use of technology depends partly on the skills, support structures and organisational environment surrounding media workers. In television broadcasting, creative application can therefore be seen as the point at which technology moves beyond routine use and becomes a resource for experimentation, new programme formats, multimedia storytelling, platform-specific content and deeper audience interaction. This makes creative application an important bridge between **digital adoption** and **technological transformation**, and provides a basis for examining whether state-owned television stations are merely using digital technologies or are using them to rethink broadcasting practice.

1.2 Theoretical framework

This study draws on Diffusion of Innovation Theory **and the** Technology-Organisation-Environment (TOE) framework.

Everett M. Rogers developed Diffusion of Innovation Theory, first published in 1962 and subsequently refined in later editions, to explain how innovations spread through communication channels over time within a social system. Rogers (2003) identifies the perceived characteristics of an innovation, including relative advantage, compatibility, complexity, trialability and observability, as factors that influence adoption. The theory is relevant because the movement of digital technologies into television broadcasting involves decisions about whether new production, editing, distribution and communication technologies are accepted and incorporated into existing broadcasting practices.

The TOE framework, developed by Tornatzky and Fleischer (1990), complements this perspective by explaining organisational technology adoption through three contextual dimensions: the **technological context**, which concerns available technologies and their characteristics; the **organisational context**, which includes resources, managerial support, staff competence and organisational

structures; and the **environmental context**, which encompasses external conditions such as regulation, competition and institutional pressures. The TOE framework is particularly relevant to this study because the transition from digital adoption to technological transformation cannot be explained by technology alone. The capacity of state-owned television stations to integrate and creatively apply digital technologies may depend on infrastructure, financial resources, staff capability, management support and the wider broadcasting environment. Together, the two theories allow the study to examine both how digital technologies are adopted **and** the organisational and environmental conditions that determine how deeply those technologies become integrated into broadcasting practice.

1.3 Empirical review

Emwinromwankhoe and Ekhareafo (2021) examined the influence of ICTs on three broadcast stations in Edo State using a census survey of all 379 staff of Independent Television/Radio, Edo Broadcasting Service and NTA. Their findings showed that **95%** of respondents reported ICT application to a great extent, while **100%** acknowledged that ICTs had influenced broadcasting operations and **92.3%** described the influence as positive. The study also found that 92.3% identified ICT influence across information gathering, programme production and editing, programme relay, display, and storage. However, the same 92.3% identified lack of training, erratic power supply, high ICT costs, poor internet facilities, problems of source authenticity and inadequate ICT supply as combined challenges. The study therefore demonstrates that substantial technology use can coexist with structural constraints. Its evidence establishes the operational value of ICT adoption, but it does not explain whether extensive use has produced deeper creative and organisational transformation.

Jemila et al. (2025) moved the evidence to selected broadcast organisations in Abuja, examining **Channels TV, NTA and FRCN** through a survey involving **390 respondents**. The researchers found strong awareness and adoption of ICTs, with **59.2%** of respondents reporting awareness of ICT adoption in the stations and **70.0%** either strongly agreeing or agreeing that software technologies had been adopted. Application was particularly strong in news gathering, where **91.9%** either strongly agreed or agreed that ICT application was satisfactory. Similar positive responses were reported for news processing at **84.9%** and news dissemination at **84.1%**. The findings reinforce the Edo evidence that digital technologies have become embedded in core broadcasting activities, but they also expose the limitation of an adoption-centred perspective. High reported application does not by itself establish whether stations have redesigned production routines, developed new content forms or transformed organisational practices.

Alaekwe et al. (2025) examined the influence of digital technologies on broadcasting practices among **200 journalists in Imo State**, using a **census-based survey**. All 200 respondents reported using ICT tools in news gathering and production, while **60%** indicated that they used ICTs to a large extent and a further **27%** reported high usage. Respondents perceived digital technologies as improving broadcasting, with an average mean of **3.4**, while their perceived influence on news production recorded an average mean of **3.5**. Specific results included mean scores of **3.6** for improved video, visual and picture quality, **3.5** for faster news production and dissemination, and **3.6** for audience participation and feedback. Yet, the challenges cluster also recorded a mean of **3.3**, particularly for inadequate training, poor ICT infrastructure, insufficient maintenance resources, and the cost of digital equipment. Compared with the Edo and Abuja studies, the Imo evidence moves closer to the question of technological transformation because it demonstrates changes in workflow quality and audience

interaction. Nevertheless, its focus remains on journalists' perceptions within one state rather than comparative organisational transformation across state-owned television stations.

Emenike (2024) examined the **preparedness and challenges of television stations in Asaba, Delta State**, using a descriptive survey of **160 television staff**. The study found a **moderate level of preparedness** for migration to digital broadcasting, with staff training and communication about the migration process already underway, although public awareness remained inadequate. Financial constraints, insufficient technical expertise, inadequate digital equipment, poor infrastructure, regulatory delays, staff resistance and high maintenance costs were identified as major challenges, with the study describing their intensity as high. When considered alongside the findings from Edo, Abuja and Imo, the evidence reveals a consistent Nigerian pattern: digital technologies are being adopted and are improving production, dissemination and operational processes, but the depth of transformation remains conditioned by human capacity, infrastructure, finance and organisational support. Existing studies have therefore established the **presence and benefits of digital adoption**, but have given less attention to comparing how these technologies are integrated creatively into the wider organisational systems of state-owned television stations. The present study addresses this gap by examining selected stations in Nasarawa, Plateau and Benue States and shifting the analytical emphasis from adoption alone to **integration, creative application and technological transformation**.

2 Methodology

This study adopted a **cross-sectional survey design** to examine technological transformation in selected state-owned television stations in Nasarawa, Plateau and Benue States, Nigeria. The study population comprised broadcasting personnel in the selected stations, from which **150 respondents**, representing 50 respondents from each station, were selected using convenience sampling based on accessibility and willingness to participate. Primary data were collected through a structured questionnaire developed from the study objectives and reviewed literature on digital technology adoption, technological transformation, and creative application in broadcasting.

The questionnaire used a five-point Likert scale and covered digital technology adoption and integration, creative application, organisational implications, and institutional, infrastructural and human-capital factors influencing technological transformation. Data were analysed using frequencies, percentages, means and standard deviations (**with** 3.00 as the decision benchmark), while multiple regression analysis was used to examine relationships among the major variables and the factors associated with technological transformation. Statistical significance was assessed at the **5% level**.

3 Results

3.1 Question one: What is the level of digital technology adoption and integration in the state-owned television stations in Nasarawa, Plateau and Benue States?

In answering this research question, Table 1 presents the level of digital technology adoption, while Table 2 presents the level of digital technology integration in the selected television stations.

Table 1. Level of Digital Technology Adoption.

Level of Adoption	Frequency	Percentage (%)
Very High	39	26.0
High	67	44.7
Moderate	32	21.3
Low	12	8.0
Total	150	100.0

Table 1 shows that **67 respondents (44.7%)** rated the level of digital technology adoption as high, while 39 respondents (26.0%) rated it very high. A further 32 respondents (21.3%) reported a moderate level of adoption, while only 12 respondents (8.0%) reported a low level. The findings indicate that digital technologies have gained substantial use across the selected state-owned television stations, although adoption is not uniform among the stations.

Table 2. Level of Digital Technology Integration.

Level of Integration	Frequency	Percentage (%)
Very High	28	18.7
High	61	40.7
Moderate	43	28.7
Low	18	12.0
Total	150	100.0

Table 2 indicates that 61 respondents (40.7%) rated digital technology integration as high, while 28 respondents (18.7%) reported a very high level. However, 43 respondents (28.7%) considered the level moderate and 18 respondents (12.0%) reported a low level. Compared with adoption, the lower proportion reporting very high integration suggests that the presence and use of digital technologies have not necessarily translated into their full incorporation across broadcasting operations.

3.2 Question two: How are digital technologies creatively applied in the state-owned television stations?

Table 3. Creative Application of Digital Technologies.

Statement	Mean	SD	Decision
I use digital tools when developing programme ideas.	3.76	0.94	Accepted
I use digital editing tools to improve programme content.	4.01	0.82	Accepted
I use social media to promote programmes and news.	3.83	0.96	Accepted
I use digital tools to combine different forms of content in my work.	3.48	1.02	Accepted
I mainly use digital technology for routine production tasks.	3.12	1.09	Accepted
Average Mean	3.64	0.97	Accepted

Table 3 shows that all five statements recorded mean scores above the 3.00 criterion. The highest mean was recorded for the use of digital editing tools to improve programme content ($M = 4.01$), followed by the use of social media to promote programmes and news ($M = 3.83$). The lowest mean was recorded for the use of digital technology mainly for routine production tasks ($M = 3.12$). The average mean of 3.64 indicates that respondents generally perceived digital technologies as being applied beyond basic equipment use, although routine production remains a significant area of application.

3.3 Question three: What transformations have digital technologies brought to broadcasting in the selected state-owned television stations?

Table 4. Technological Transformation in Broadcasting.

Statement	Mean	SD	Decision
I have observed that digital technology has made programme production faster.	4.08	0.83	Accepted
Digital technology has improved the quality of television content.	4.02	0.86	Accepted
I have observed that digital technology has made content distribution across social media platforms easier.	3.91	0.91	Accepted
Digital technology has changed how broadcasting staff perform their work.	3.68	1.01	Accepted
There is little or no effect of digital technology on broadcasting operations.	2.71	1.13	Rejected
Average Mean	3.68	0.95	Accepted

Table 4 indicates that respondents generally perceived substantial changes in broadcasting operations following the adoption of digital technologies. The strongest assessment concerned faster programme production ($M = 4.08$), followed by improved television content quality ($M = 4.02$) and easier content distribution ($M = 3.911$). The statement that digital technology had little effect on broadcasting operations was rejected ($M = 2.71$). The average mean of 3.68 therefore indicates that digital technology has contributed to noticeable operational and production changes within the selected stations.

3.4 Question four: What challenges impede digital technology adoption, integration and transformation in the selected state-owned television stations?

Table 5. Challenges to Digital Technology Adoption, Integration and Transformation.

Item Statement	Mean	SD	Decision
Inadequate funding has, to an extent limited, the acquisition of some digital equipment.	4.21	0.84	Accepted
Unstable electricity supply sometimes affects the use of digital technology.	4.29	0.78	Accepted
Few staff in the technical unit lack adequate training, which limits the effective use of new technology.	4.05	0.91	Accepted
Poor internet connectivity affects digital broadcasting activities.	3.87	1.02	Accepted
The cost of maintaining digital equipment is not a major problem.	2.68	1.14	Rejected
Average Mean	3.82	0.94	Accepted

Table 5 identifies several challenges affecting digital technology adoption, integration and transformation. Unstable electricity supply recorded the highest mean ($M = 4.29$), followed by inadequate funding ($M = 4.21$, $SD = 0.84$) and inadequate staff training ($M = 4.05$). Poor internet connectivity was also accepted as a challenge ($M = 3.87$). The statement that the cost of maintaining digital equipment is not a major problem was rejected ($M = 2.68$). The grand mean of **3.82** indicates that the selected stations continue to face substantial constraints that can limit deeper digital adoption, integration and transformation.

3.5 Test of hypothesis

H_0 : Digital technology adoption, integration and creative application do not significantly predict technological transformation in the selected state-owned television stations.

Table 6. Model Summary.

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.738	.545	.536	.471

Table 7. Analysis of variance (ANOVA) for the regression model.

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	51.284	3	17.095	77.060	<.001
Residual	42.021	146	0.288		
Total	93.305	149			

Table 8. Regression coefficients for the predictors of technological transformation.

Model	Unstandardised B	Std. Error	Standardised Beta	t	Sig.
Constant	0.614	0.247		2.49	.014
Digital technology adoption	0.218	0.067	0.241	3.25	.001
Digital technology integration	0.327	0.071	0.361	4.61	<.001
Creative application	0.289	0.069	0.312	4.19	<.001

Note: Predictors: digital technology adoption, digital technology integration, creative application. Dependent variable: technological transformation.

Table 6 shows an R value of 0.738, indicating a strong combined relationship between digital technology adoption, integration and creative application and technological transformation. The R^2 value of 0.545 indicates that the three predictors jointly explain 54.5% of the variation in technological transformation, while the remaining 45.5% is attributable to other factors not included in the model. The adjusted R^2 of 0.536 indicates that the model retains substantial explanatory power after adjustment for the number of predictors.

The ANOVA result (Table 7) shows that the regression model is statistically significant, $F(3,146) = 77.060$, $p < .001$. This indicates that digital technology adoption, integration and creative application jointly make a significant contribution to explaining technological transformation in the selected state-owned television stations. The null hypothesis is therefore rejected.

Table 8 shows that digital technology adoption significantly predicts technological transformation ($B = 0.218$, $\beta = 0.241$, $t = 3.25$, $p = .001$). Digital technology integration also has a significant positive effect on technological transformation ($B = 0.327$, $\beta = 0.361$, $t = 4.61$, $p < .001$). Creative application likewise significantly predicts technological transformation ($B = 0.289$, $\beta = 0.312$, $t = 4.19$, $p < .001$). Among the three predictors, digital technology integration has the largest standardised beta coefficient ($\beta = 0.361$), followed by creative application ($\beta = 0.312$) and digital technology adoption ($\beta = 0.241$). The regression findings therefore provide evidence that technological transformation is associated not only with the adoption of digital technologies but also with the extent to which those technologies are integrated into broadcasting activities and applied creatively. The null hypothesis is rejected at the 5% significance level.

4 Discussion of findings

The study found a high level of digital technology adoption and integration across the selected state-owned television stations, although integration was less pronounced than adoption. This finding agrees with Jemila et al. (2025), who reported high ICT adoption and application in selected broadcast stations in Abuja, particularly in news gathering, processing and dissemination. The study also found that digital technologies were creatively applied to programme development, editing, promotion and content combination, supporting Alaekwe et al. (2025), who found universal ICT use among sampled Imo journalists and reported improved speed and efficiency in broadcasting. Digital technology was further associated with faster production, improved content quality, easier distribution, and changes in staff work practices, consistent with Alaekwe et al. (2025). Finally, respondents identified funding, electricity, training, internet connectivity, and maintenance as constraints, closely reflecting Emenike's (2024) findings on financial, infrastructural, technical, and maintenance barriers to digital migration in Asaba. The regression result further indicates that adoption, integration, and creative application jointly significantly predicted technological transformation, suggesting that transformation extends beyond simply acquiring digital technologies.

5 Conclusion

Digital transformation in state-owned television broadcasting extends beyond the acquisition of digital equipment. It depends on how effectively technology becomes embedded in everyday production, content development, distribution and professional practice. The evidence points to substantial digital adoption across the selected stations, but also reveals a gap between having digital technologies and integrating them deeply into broadcasting operations. Creative application appears to be an important bridge between technological availability and meaningful change, particularly through digital editing, programme development, content promotion and new approaches to production. At the same time, inadequate funding, unstable electricity, limited staff training, poor internet connectivity and maintenance costs continue to constrain the depth of this transformation. The central issue for state-owned broadcasters, therefore, is no longer simply whether digital technologies are available, but whether the organisational environment can support their sustained and creative use. Meaningful transformation requires investment in infrastructure alongside continuous professional development and organisational practices that allow broadcasters to move from basic technology use towards deeper integration and innovation.

6 Recommendations

State-owned television broadcasters should move beyond equipment acquisition towards sustained technological integration by directing resources to reliable power, internet connectivity, equipment maintenance and regular upgrading of digital infrastructure. Station management should also institutionalise continuous professional development in digital editing, multimedia production, streaming, social media content and other emerging broadcasting applications, while creating opportunities for staff to experiment with new digital formats and production approaches. At the policy level, state governments should provide predictable funding frameworks that support both technological renewal and human-capital development. These measures would help narrow the observed gap between digital technology adoption and deeper organisational integration, allowing state-owned broadcasters to derive greater operational and creative value from their digital investments.

7 Suggestions for future studies

Future studies could extend the geographical coverage beyond the three North-Central states examined here to provide evidence from other regions of Nigeria and enable broader comparison of state-owned broadcasting systems. Longitudinal research could also examine how technological transformation develops over time rather than relying on a cross-sectional assessment. Further studies may combine staff perceptions with audience data, management perspectives and objective indicators such as production efficiency, digital platform activity and content reach

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