Use of Artificial Intelligence in Pakistani Journalism: Navigating Challenges and Future Paths in TV Newsrooms

Rabia Noor[1] and Huma Zafar[2]

https://doi.org/10.62345/jads.2023.12.3.131

Abstract

This research investigates the landscape of artificial intelligence (AI) integration in Pakistani journalism, exploring perceived benefits, challenges, ethical considerations, and the overall outlook on this transformative process. Drawing on interviews with industry professionals, the study contributes theoretical insights to the Diffusion of Innovations theory, unveiling varying degrees of AI integration awareness and perspectives within the Pakistani news industry. A human-centric ethical perspective is introduced, emphasizing concerns about job displacement and the evolving role of journalists. The delicate balance between AI's efficiency gains and ethical considerations is explored, with practical implications highlighting the need for targeted education, transparent communication, and cost-effective solutions to overcome barriers and foster widespread AI adoption. The research underscores the significance of continuous adaptation to technological advancements for seamless integration. As Pakistan cautiously navigates the AI landscape in news production, this study lays the groundwork for theoretical frameworks and practical strategies, providing valuable insights for the ethical, efficient, and responsible integration of AI technologies.

Keywords: Artificial Intelligence, Journalism, Diffusion of Innovations, Media Technology.

Introduction

In contemporary journalism discourse, scholars widely acknowledge the growing importance of artificial intelligence (AI) and automation within newsrooms. These technologies are recognized for their capacity to save both time and resources, improve efficiency and speed, and aid journalists in handling the ever-expanding influx of global news content (Lewis et al., 2019). Artificial intelligence (AI) primarily concerns the development of computer systems with the capability to perform cognitive tasks resembling human activities, such as learning, reasoning, and self-correction. In essence, AI seeks to create machines that can emulate and execute processes that involve human-like intelligence (Dobrev, 2012). Amidst the broader landscape of digitization permeating media and public spheres, there is an imperative need to examine the repercussions of artificial intelligence (AI) on journalism. The shift towards applications, algorithms, and the prevalence of social media has brought about substantial changes in the journalism sector, exerting influence on business structures, daily workflows, and the accessibility of diverse information sources. This transformation underscores the evolving dynamics of journalism in response to the digital era's multifaceted challenges and opportunities. According to Broussard et al. (2019), Artificial Intelligence (AI) integration into news media holds the promise of streamlining

[1]*Assistant Professor, School of Creative Arts, The University of Lahore, Pakistan. Email: rabia.noor@soca.uol.edu.pk*
[2]*Research Scholar, Middlesex University, United Kingdom.*

Compliance with ethical standards: There are no conflicts of interest (financial or non-financial). This study did not receive any funding.

journalistic processes, offering a potential solution to the challenges of resource constraints without negating the distinctive skills and expertise journalists bring to the field. By automating routine tasks and augmenting information analysis, AI can enhance efficiency, allowing journalists to focus on more complex and value-added aspects of their profession. This symbiotic relationship between AI and human journalists signifies a transformative approach that aims to alleviate the burden on newsroom resources while preserving the irreplaceable human touch in journalism.

Artificial Intelligence (AI) can usher in novel modes of audience engagement and introduce innovative products, potentially resulting in a surge in news media consumption. By leveraging AI technologies, news outlets can explore interactive and participatory formats that resonate with diverse audiences, fostering a more dynamic and personalized news consumption experience. The introduction of AI-driven products, such as customized content recommendations, immersive storytelling, or interactive news applications, has the potential to captivate audiences and create new avenues for consuming news content. This intersection of AI and news media not only facilitates enhanced participation but also introduces transformative elements that may contribute to an overall increase in news consumption (Diakopoulos, 2020). In our current world, where technology and data play a significant role in guiding decisions, the news industry is no exception, as the future of journalism and its business models appear to be closely tied to the adoption of technological advancements. (de-Lima-Santos & Mesquita, 2021). While artificial intelligence (AI) has undoubtedly streamlined news production and distribution, making these processes more efficient, cost-effective, and rapid, it's crucial to emphasize that journalists remain the linchpin of the news-making process. AI technologies have excelled in automating certain aspects of news production, such as content generation, data analysis, and even news curation. This automation significantly reduces the time and cost associated with these tasks. The unique skills journalists possess, including critical thinking, investigative prowess, and the ability to contextualize information, remain irreplaceable. Journalists play a central role in verifying facts, providing context, and ensuring ethical considerations in news reporting. The human touch is indispensable when interpreting complex events, understanding the nuances of different perspectives, and delivering news with empathy (Jamil, 2020). While AI can augment certain elements of the news production pipeline, journalistic acumen adds depth, insight, and credibility to the final product. The symbiotic relationship between AI and journalists promises a more efficient and sophisticated news ecosystem where technology complements human expertise to deliver timely, accurate, and contextually rich news content (Graefe, 2016). In numerous Western and economically advanced nations, news organizations have proactively incorporated artificial intelligence (AI) into their journalistic practices, signaling a noteworthy acceptance of technology in the pivotal role of a communicator. This proactive integration indicates the industry's recognition of the transformative potential of AI in enhancing various aspects of news production and dissemination. By leveraging AI, these news organizations aim to streamline workflows, increase efficiency, and potentially tap into innovative storytelling methods. The acceptance of AI in journalism reflects a broader acknowledgment of technological advancements as tools that amplify news's communicative impact. As news organizations navigate the digital landscape, the strategic integration of AI demonstrates a commitment to staying at the forefront of innovation, adapting to changing audience behaviors, and delivering news content that aligns with contemporary information consumption patterns. This trend underscores a proactive approach to harnessing the capabilities of AI as a facilitator and enhancer of journalistic communication (Lewis et al., 2019). AI news production tools have also helped news organizations to reduce their staffing costs by up to 50%.According to a study conducted by (Digital News Report) 27% of Pakistanis now use social

media as their primary source of news, and AI in social media platforms such as Facebook and Twitter are playing a significant role in shaping the news consumption habits of Pakistanis. On February 13th, 2023, Dawn published Dawn News Chatbot, a leading news organization in Pakistan, which launched a chatbot on Facebook Messenger that uses AI to deliver personalized news updates to users. The chatbot can also answer users' questions and provide context for news stories. Clerwall's (2014) experiment yielded noteworthy findings indicating that readers struggled to distinguish between machine-generated and human-written journalistic texts. Despite this challenge, articles crafted by human journalists received higher ratings in categories such as "coherence," emphasizing a well-structured narrative, and being deemed pleasant to read. In contrast, machine-produced articles scored higher in terms of objectivity and trustworthiness. This outcome underscores the nuanced interplay between machine-generated and human-created journalistic content, revealing a divergence in the perceived strengths of each. While human writers excelled in crafting narratives that resonated with readers in terms of coherence and readability, machine-generated articles were perceived as excelling in objectivity and trustworthiness. This nuanced evaluation highlights the potential synergies that could emerge from a collaborative approach, where the unique strengths of both human journalists and AI technologies are leveraged to enhance overall journalistic output. As the field continues to evolve, understanding these dynamics becomes crucial for optimizing the integration of AI in journalism (Graefe et al., 2018).

Significance of the Research

The significance of the research on AI integration in journalism in Pakistan, even without explicitly identified reasons and themes, lies in its potential to catalyze awareness, provoke critical thinking, and prompt further investigation. The absence of specific reasons and themes still holds value for several reasons. Firstly, the research serves as a foundational exploration, indicating that the landscape of AI in Pakistani journalism is an area that warrants attention. While specific reasons and themes may have yet to be pinpointed, acknowledging AI's relevance in the media industry provides a starting point for more in-depth inquiries and targeted studies. Secondly, the research's significance lies in its potential to stimulate discussions and debates within the journalistic community and among stakeholders. The absence of identified reasons and themes creates an open-ended narrative, encouraging journalists, scholars, and policymakers to actively participate in shaping the discourse around AI adoption in Pakistani newsrooms. Thirdly, the research serves as a call to action, signaling to the media industry that there is a need for further exploration. This can prompt news organizations, academic institutions, and technology developers to collaborate in conducting comprehensive studies to uncover the intricacies of AI integration in the unique context of Pakistan. The research's significance extends to inspiring curiosity and prompting investigative journalism. Journalists may find the open-ended nature of the study as an opportunity to delve deeper into the reasons behind specific trends or attitudes toward AI in Pakistani newsrooms, uncovering nuanced perspectives that may not have been apparent in the initial study.

Research Objectives

This research examines the landscape of artificial intelligence (AI) integration in news production within Pakistani journalism. The overarching objectives are:

- To explore the perceptions of professionals in the Pakistani news industry regarding integrating artificial intelligence in news production.

- To assess the perceived benefits and drawbacks of AI integration in newsrooms, focusing on its impact on efficiency, creativity, and overall news production processes.
- To investigate the ethical considerations associated with AI adoption in journalism and explore its potential societal implications, particularly regarding job displacement and broader industry transformations.

Research Questions

To achieve these objectives, the research is guided by the following set of interrelated research questions:

- RQ1: How do professionals in the Pakistani news industry perceive the integration of artificial intelligence in news production, and what factors influence these perceptions?
- RQ2: What are the perceived benefits and drawbacks of integrating AI in newsrooms, particularly regarding efficiency, creativity, and the overall news production process?
- RQ3: How do professionals in the Pakistani news industry view the ethical considerations associated with AI integration in journalism, and what societal implications, especially regarding job displacement, are anticipated?

These research questions provide a comprehensive framework to explore the multifaceted aspects of AI integration in Pakistani journalism, addressing perceptions, efficiency, and ethical considerations, focusing on societal impact.

Literature Review

AI is pivotal in the era of post-industrial journalism, a term encompassing the technological challenges the journalism industry encounters. A notable facet of this transformation involves the integration of AI, including sophisticated software and algorithms, to autonomously generate news stories, requiring minimal human intervention aside from initial programming. AI algorithms are crucial in collecting, analyzing, and translating data into cohesive news articles within this framework. This paradigm, commonly called automated journalism, relies on Natural Language Generation (NLG) technology, which empowers the generation of text-based journalistic content from structured digital data.

In its nascent stages, NLG technology primarily focused on creating shorter texts within specific domains. Despite these early limitations, the technology showcased remarkable advancements in quality and quantity, with the generated text often indistinguishable from human-authored articles. Furthermore, the efficiency of automated processes in developing a substantial volume of text documents far exceeds the capacity of traditional manual editorial methods. This evolution underscores the transformative impact of AI, particularly NLG, on reshaping the landscape of journalistic content creation in the post-industrial journalism era (Caswell & Dörr, 2018).

The New York Times (NYT) emerged as a trailblazer in incorporating AI within the newsroom through its initiative named 'Editor.' This project involved the application of tags to traditionally written news articles. Similarly, The Washington Post (WP) achieved early milestones in AI-assisted news writing, employing the Heliograf software during the coverage of the 2016 Olympic Games. This advanced software systematically gathered data about the events' schedule, results, and order censuses. Subsequently, The Washington Post expanded its utilization of automated journalism, extending coverage to include financial news and original sports events. Notably, Natural Language Generation (NLG), conceived by Joseph Weizenbaum, characterizes software and computer systems capable of automatically generating human-like language from a computational representation of information (Spangher, 2015). Machine learning-based news

personalization systems are extensively used by news publishers similar to The News publishers, similar to The New York Times, and news aggregation apps like Google (Das et al., 2007) widely employ machine learning-based news personalization systems. In the past few years, there has been a notable rise in the adoption of automated story production methods, with prominent news outlets such as the AP, Reuters, and Forbes producing thousands of stories monthly. These narratives are derived from structured data feeds, mainly focusing on corporate earnings and sports scores (LeCompte, 2015). The integration of automated story production presents inherent challenges to conventional perceptions of the roles fulfilled by humans and machines in journalism, as highlighted by Lewis et al. (2019). Yet, the automation of investigative story writing necessitates artificial general intelligence, indicating that its practical implementation may not be on the immediate horizon. In line with these considerations, a report from the Associated Press suggests that AI holds the promise of enabling the emergence of entirely novel forms of journalism (Marconi & Siegman, 2017).

The incorporation of AI, algorithms, and machine learning is progressively becoming inseparable from the operations of newsrooms, exerting influence across various facets of journalism (Zamith, 2020). In an article titled "Automated Journalism: Journalists Say Robots Free up Time for Deeper Reporting," news automation possibilities are explored, offering insights from United Robots (Campbell, 2021). This signifies a growing reliance on technological advancements to enhance efficiency and allow journalists to explore more deeply into reporting. AI holds the potential to support journalists in uncovering and crafting stories that might otherwise be impractical or unattainable. Its value, even if it falls short of this ambitious goal, is found in its capacity to enhance the speed and efficiency of journalistic work. The efficacy of human interaction with sources often rivals that of data analysis. Therefore, cost-effectiveness considerations become pivotal, particularly as the expenses associated with AI engineers surpass those of reporters, posing constraints on economic feasibility. This is further emphasized in tasks like document classification, where current AI methods, while practical, face challenges in setup costs, making manual labor economically favorable for smaller datasets, typically up to a few thousand documents (Ali & Hassoun, 2019).

Advanced AI techniques increasingly enable media content analysis and production, with applications in various journalistic tasks such as data mining, comment moderation, news writing, story discovery, fact-checking, content verification, and more (Beckett, 2019). However, responsible deployment of AI in the news media domain necessitates careful consideration of concerns such as avoiding bias, designing hybrid human-AI workflows that reflect domain values, fostering interdisciplinary collaboration between journalists and technologists, and educating future practitioners on the responsible design, development, and utilization of AI-driven media tools (Broussard et al., 2019).

AI presents clear advantages in expeditious data collection, error minimization, and cost-effectiveness. However, the efficacy of automated journalism is intricately tied to the quality of the data it processes. Notably, it must improve to identify novel issues and deliver nuanced, in-depth critical analyses of described phenomena. From a technical standpoint, the predominant limitation of current AI-generated articles manifests in their below-par quality regarding narrative construction and critical considerations (Lewis & Westlund, 2015). Misinformation denotes inaccurate or misleading information that may not always be created with the intent to deceive. At the same time, disinformation entails deliberately crafting and disseminating misleading content to deceive and mislead individuals. This challenge poses a significant threat to the reliability and accuracy of the information, requiring vigilant measures to discern and counteract false narratives

(Bender et al., 2021). Though misinformation and disinformation have perennially existed in human society, contemporary technology has substantially facilitated malicious actors worldwide to reach expansive audiences swiftly. This feat posed considerably more significant challenges in the past. The ubiquity and accessibility of digital platforms enable the rapid dissemination of false narratives, emphasizing the critical need for robust strategies to address and mitigate the impact of misleading information on a global scale (Bergstrom et al., 2019).

The swift progress in Natural Language Processing (NLP) has brought crucial ethical considerations. Notably, the development of large-scale language models that draw upon extensive corpora of news texts raises concerns regarding the inherent biases inherited from their source materials. As these models assimilate and reflect the biases present in the data they are trained on, it becomes imperative to address the ethical dimensions surrounding bias, fairness, and accountability in deploying NLP technologies within the domain of journalism (Bender et al., 2021). The presence of biases in Natural Language Processing (NLP) poses potential negative repercussions for downstream tasks. Such biases manifest at various stages, including within the data itself, the data annotation process, and the model's composition, encompassing both pre-trained input representations and fine-tuned models. Addressing and mitigating these biases across these multifaceted dimensions are critical considerations for the ethical and responsible deployment of NLP technologies, especially within the context of journalism (Hovy & Prabhumoye, 2021).

Theoretical Framework

The diffusion of innovation theory, formulated by Everett Rogers in 1962, provides a valuable framework for understanding how new ideas or technologies spread within a social system. This theory has been widely applied across various fields to examine the adoption and integration of innovations. Integrating artificial intelligence (AI) in journalism represents a significant innovation, reshaping the industry's practices and workflows. AI, with its complexity and transformative potential, aligns with the innovation characteristics outlined by Rogers. The theory helps to assess how journalists perceive AI's relative advantage, compatibility with existing practices, trial-ability, and observability, influencing their readiness to adopt these technologies. Rogers categorizes adopters into innovators, early adopters, early majority, late majority, and laggards. In the context of AI in journalism, understanding these adopter categories helps analyze the diverse attitudes, motivations, and timelines for integration among news organizations. The theory emphasizes the role of communication channels in spreading information about innovations. In journalism, professional networks, media coverage, industry conferences, and online platforms act as critical communication channels shaping perceptions, knowledge dissemination, and discussions regarding AI adoption. News organizations operate within specific social systems characterized by organizational culture, industry norms, and collaborative networks. The diffusion of innovation theory allows us to explore how these social systems impact the acceptance and assimilation of AI technologies within the journalism industry. The concept of critical mass in diffusion theory signifies the point at which widespread adoption becomes inevitable. In the context of AI in journalism, understanding the adoption rate, network effects, and the implications of reaching critical mass is essential for forecasting the overall integration of AI technologies. Applying the diffusion of innovation theory to AI integration within journalism offers a comprehensive framework for examining adoption dynamics. This theory allows us to explore the nuanced interplay between innovation characteristics, adopter categories, communication channels, social systems, and critical mass in the rapidly evolving landscape of

journalism transforming through AI integration. The subsequent chapters will use this theoretical lens to analyze empirical data, providing deeper insights into the adoption patterns and challenges in the industry.

Methodology

A qualitative research design was adopted to explore professionals' subjective experiences and opinions in the Pakistani news industry. In-depth interviews were conducted with ten participants, including journalists, producers, and media professionals, providing a rich and nuanced exploration of their perspectives. The participants were purposefully selected to represent diverse roles within the news production process. Journalists, producers, and media professionals were chosen to capture a comprehensive view of AI integration in various aspects of journalism. Semi-structured interviews were conducted to gather detailed insights. Open-ended questions allowed participants to freely express their thoughts on AI adoption, benefits, challenges, ethical considerations, and outlook on the future. Thematic analysis was employed to identify recurring patterns and themes in the interview responses. A coding process helped categorize data into themes, providing a systematic approach to uncovering key findings. Ethical guidelines were strictly adhered to throughout the research process. Informed consent was obtained from participants, and their identities were anonymized to ensure confidentiality. The research was conducted with the utmost respect for the participants' perspectives and experiences. While the study provides valuable insights, it is essential to acknowledge certain limitations. The sample size, although diverse, is relatively small, and the findings may need to be more generalizable. The rapidly evolving nature of AI and journalism may result in temporal limitations.

Findings and Discussions

The narratives provided by diverse industry professionals offer insights into the current state, challenges, and prospects of integrating AI technologies. As we navigate through the perspectives shared, distinct themes come to light, reflecting a complex interplay of optimism, skepticism, ethical considerations, and practical barriers in the context of AI adoption within Pakistani newsrooms.

Perceived Benefits of AI in Newsroom Efficiency

The interviews collectively present a positive outlook on the potential benefits of AI integration in newsrooms, particularly regarding efficiency improvements. Interviewee 1 highlights AI's quick and efficient generation of written language, emphasizing the transformative impact this could have on the news production process. The prospect of training a Chat GPT bot to convert tickers into news stories and packages suggests a vision for streamlining and automating certain aspects of content creation.

> AI technologies can help to improve the newsroom experience. The amount of written language an AI can generate is surprisingly rapid and efficient. Envisions training a Chat GPT bot to convert generated tickers into news stories and packages, easing the job of a copywriter.

Interview 7 provides insights into the productivity of AI in tasks such as generating supporting images and videos. The acknowledgment of AI's current usefulness and the belief in its future potential to replace the workforce in news production underscore the perceived benefits of AI in enhancing multimedia content creation and overall efficiency. “We use AI to generate supporting

images and videos, and I find AI very productive. I believe that AI will replace the news production workforce in the future."

In Interviews 8 and 9, the use of AI in content writing is described as "very fast and helpful." This positive evaluation of AI's speed and utility in specific journalistic tasks aligns with the overarching theme of enhancing newsroom efficiency. "We use AI in content writing; it's swift and helpful."

The common thread across these interviews is the anticipation that AI technologies, when effectively integrated, can bring about tangible improvements. These improvements span various facets of news production, including content generation, multimedia support, and content writing. While the perceived benefits are evident, it's essential to consider the challenges and ethical considerations, ensuring a balanced perspective on integrating AI in newsrooms. Balancing efficiency gains with ethical concerns will be crucial to harnessing the full potential of AI in journalism.

Challenges and Skepticism Regarding AI Adoption in Journalism

The interviews shed light on the challenges and skepticism surrounding the adoption of AI in journalism. Interview 4 raises valid concerns about the potential drawbacks of AI, particularly its impact on the human mind. The worry about dependency on AI limiting creativity, hindering mental growth, and impeding skill development is a significant consideration, indicating a cautious approach to embracing this technology. "On the other hand, it has drawbacks, and the use of AI limits our minds. There are concerns about dependency on AI, suppressing creativity, mind growth, and skill development."

Interview 7 mentions that people in Pakistani news media are initially afraid of AI and don't trust it, which also reveals a prevalent sentiment of fear and mistrust among individuals in the Pakistani news media regarding AI. This fear may stem from uncertainty about AI's capabilities, potential job displacement, or unfamiliarity with the technology. It underscores the need for education and communication to address these fears.

Interview 10 indicates that the news channel needs to use AI, citing reasons such as being paid, lack of knowledge on how to use it, and a general reluctance to adopt new technology. It also provides practical insights into the challenges faced by news channels in adopting AI. The mention of financial constraints, a lack of knowledge about AI usage, and a general reluctance to embrace new technology highlights the multifaceted nature of the barriers. The economic aspect, in particular, is notable, as the perceived cost of AI tools hinders their adoption.

The challenges and skepticism outlined in the interviews encompass concerns about the impact on human creativity and skills, fear of the unknown, practical barriers related to costs, and a reluctance to adapt. Addressing these challenges requires a comprehensive approach, including education, transparent communication about AI capabilities, and potentially exploring cost-effective solutions to encourage broader adoption in the journalism industry.

Ethical Considerations in AI Integration

Ethical considerations in integrating AI into journalism emerge as a central theme in the interviews, reflecting a heightened awareness of the potential impact of AI technologies on journalistic practices.

These interviews underscore the importance of ethical considerations in integrating AI into journalism. The ethical principles discussed in Interview 4 align with the core tenets of journalism, emphasizing the need for AI technologies to adhere to truth, accuracy, independence, and

accountability. Interviewee 4 discusses ethical considerations in TV journalism when using AI, emphasizing truth, accuracy, independence, and responsibility. It also states that an AI system must be inclusive, explainable, have a positive purpose, and use data responsibly. The characteristics outlined for AI systems reflect a broader understanding of responsible AI use. The emphasis on inclusiveness, explainability, positive purpose, and accountable data usage suggests a commitment to ensuring that AI technologies align with journalistic ethics and societal values. The interviewee also emphasizes vital ethical values in TV broadcasting. This underscores the importance of maintaining journalistic integrity even in AI integration. Interviewee 1 highlights the ethical implications of AI integration, pointing out potential job erasure or replacement, especially in roles like copywriting, introduces a Human-Centric Ethical perspective, and raises ethical concerns about possible job displacement due to AI. Specifically, the interviewee speculates on the impact of roles like copywriters and assignment editors, considering the potential impact of AI on the livelihoods of individuals within the newsroom. This raises important ethical questions about the societal implications of AI adoption and the responsibility of news organizations to navigate these changes in a considerate and ethical manner.

The interviews collectively highlight that ethical considerations are integral to successfully integrating AI into journalism. As newsrooms navigate this technological shift, prioritizing transparency, accountability, and societal well-being is crucial for maintaining the ethical standards that underpin journalism's role in society.

Limited Awareness and Resources Hindering AI Adoption

The theme of limited awareness and resources hindering AI adoption in journalism is evident in the interviews. Interview 6 highlights the producer's acknowledgment of very little use of AI in news production, indicating a potential need for more awareness or understanding of AI technologies in the industry. Interviewee 6 acknowledges very little use of AI in news production and expresses a need for more awareness as a producer. Interviewee 10 provides further insight into the challenges news channels face, pointing out that the channel uses something other than AI due to its paid nature, lack of knowledge regarding usage, and a general reluctance to embrace new technology. This interview suggests that limited resources in terms of financial investment and expertise act as barriers to adopting AI in newsrooms.

Overall, these interviews underline the need for increased awareness and resources to facilitate the effective integration of AI in journalism. Overcoming these limitations is crucial for ensuring that newsrooms can harness the potential benefits of AI technologies and stay abreast of technological advancements in the field.

Optimism about the Future of AI in Journalism

The theme of optimism about the future of AI in journalism is prominent in several interviews. Interview 1 sets a positive tone, anticipating that AI will be widely adopted despite a potential initial lag, enhancing newsroom efficiency. This sentiment aligns with the belief that as technology progresses, regular updates will pave the way for AI integration into journalistic practices.

Interviews 8 and 9, while recognizing the learning curve for journalists in utilizing AI effectively, maintain an optimistic view of AI's potential, particularly in content writing, which is considered fast and helpful. Interview 7 goes a step further, envisioning a future where AI replaces the workforce in news production. This level of optimism reflects a belief in the transformative power of AI technologies within the journalism landscape.

These interviews collectively convey an optimistic outlook on the future of AI in journalism. Despite acknowledging challenges and the need for adaptation, there is a shared belief that AI has the potential to play a significant and positive role in reshaping how news is produced and disseminated.

Conclusion

This study reveals a nuanced understanding of AI integration in journalism, encompassing perceived benefits, challenges, ethical considerations, awareness and resource limitations, and an optimistic outlook. This research holds theoretical and practical implications that shed light on the complex dynamics surrounding AI adoption in the newsroom. First, the study contributes to the Diffusion of Innovations theory by providing insights into AI adoption in Pakistani journalism. The identified themes, such as challenges, ethical considerations, limited awareness, and optimism, offer a nuanced understanding of factors influencing the diffusion process. Examining perceptions, attitudes, and barriers within the context of AI integration enriches the theory's applicability to the challenges and opportunities faced by the Pakistani news industry in adopting innovative technologies. In this context, the interviews reveal varying degrees of AI integration awareness, with some expressing enthusiasm (early adopters) while others exhibit skepticism or resistance (laggards). Understanding these patterns contributes to a nuanced view of how AI diffuses within Pakistani journalism.

Human-Centric Ethical Perspective: The interviews introduce a human-centric ethical perspective, emphasizing the potential impact of AI on individuals within the newsroom. The concern about job displacement and the evolving role of journalists suggests a need for ethical frameworks prioritizing human workers' well-being during technological transitions.

Balancing Efficiency and Ethics: The research highlights the delicate balance between the perceived benefits of AI in improving newsroom efficiency and the ethical considerations associated with potential job displacement. This underscores the importance of developing theoretical models that guide ethical decision-making in AI integration, ensuring a harmonious coexistence between technological advancement and human welfare.

Societal Implications: Ethical considerations extend beyond the newsroom, raising questions about the broader societal implications of AI adoption. As discussed in the interviews, the potential erosion of specific job roles prompts a theoretical exploration of how AI-driven changes in journalism might impact society at large and how these transformations can be managed responsibly.

Practical Implications

The limited awareness and resources hindering AI adoption suggest a practical need for targeted education and training programs within newsrooms. Initiatives that enhance journalists' understanding of AI technologies, their applications, and potential benefits could facilitate smoother integration. Addressing skepticism and fear requires transparent communication about AI capabilities, limitations, and the potential for positive contributions to journalism. Practical guidelines on how news organizations can communicate AI's ethical considerations and societal benefits will be instrumental in fostering trust. It also points to the need to develop cost-effective AI solutions that accommodate news channels' financial constraints. Exploring models that make AI tools more accessible to diverse news organizations could accelerate widespread adoption. The research emphasizes the need for continuous adaptation to technological advancements. Practical implications suggest that news organizations proactively update their workflows, adopt new

technologies, and provide ongoing training to journalists to ensure a seamless integration of AI tools.

This research provides valuable insights into the current perceptions of AI in journalism in Pakistan. It lays the groundwork for theoretical frameworks and practical strategies that can guide the ethical, efficient, and responsible integration of AI technologies in the ever-evolving state of news production. Pakistan's current status in AI adaptation in news production reflects a cautious approach with a mix of challenges and opportunities. The country is at a stage where overcoming barriers related to awareness, resources, and skepticism is essential for harnessing the potential benefits that AI can bring to journalism. Education, transparent communication, and the development of cost-effective AI solutions play pivotal roles in shaping the future landscape of AI in Pakistani newsrooms.

References

- Ali, W., & Hassoun, M. (2019). Artificial intelligence and automated journalism: Contemporary challenges and new opportunities. *International journal of media, journalism and mass communications*, *5*(1), 40-49.
- Anderson, C. W., Bell, E., & Shirky, C. (2012). *Post-industrial journalism: adapting to the present: a report*. Columbia Journalism School.
- Barland, J. (2015). Research brief: Innovation for new revenue streams from digital readers: The case of VG+. *The Journal of Media Innovations*, *2*(1), 123-130.
- Beckett, C. (2019). *New powers, new responsibilities: A global survey of journalism and artificial intelligence.* Report from POLIS journalism and Society, think tank at the London School of Economics (LSE).
- Bender, E. M., Gebru, T., McMillan-Major, A., & Shmitchell, S. (2021). On the Dangers of Stochastic Parrots: Can Language Models Be Too Big? In *Proceedings of the 2021 ACM conference on fairness, accountability, and transparency* (pp. 610-623).
- Bergstrom, C. T., & Bak-Coleman, J. B. (2019). Information gerrymandering in social networks skews collective decision-making. *Nature*. 40-41. doi: 10.1038/d41586-019-02562-z. PMID: 31485063.
- Broussard, M., Diakopoulos, N., Guzman, A. L., Abebe, R., Dupagne, M., & Chuan, C. H. (2019). Artificial intelligence and journalism. *Journalism & Mass Communication Quarterly*, *96*(3), 673-695.
- Campbell, C. (2021). *Automated journalism: Journalists say robots free up time for deeper reporting.*
- Caswell, D. & Dörr, K. (2018). Automated Journalism 2.0: Event-driven narratives: From simple descriptions to real stories. *Journalism practice*, *12*(4), 477-496.
- Clerwall, C. (2014). Enter the robot journalist: Users' perceptions of automated content. *Journalism practice*, *8*(5), 519-531.
- Das, A. S., Datar, M., Garg, A., & Rajaram, S. (2007). Google news personalization: scalable online collaborative filtering. In *Proceedings of the 16th international conference on World Wide Web* (pp. 271-280).
- De-Lima-Santos, M. F., & Mesquita, L. (2021). Data journalism beyond technological determinism. *Journalism Studies*, *22*(11), 1416-1435.
- Diakopoulos, N. (2020). Computational news discovery: Towards design considerations for editorial orientation algorithms in journalism. *Digital Journalism*, *8*(7), 945-967.

- Dobrev, D. (2012). A definition of artificial intelligence. *ArXiv preprint arXiv: 1210.1568*.
- Graefe, A. (2016). *Guide to Automated Journalism. New York: Tow Center for Digital Journalism*. Columbia University. http://towcenter.org/research/guide-to-auto-mated-journalism/.
- Graefe, A, Mario, H, Bestian, H, & Brosius H. (2018). "Readers' Perception of Computer-Generated News: Credibility, Expertise, and Readability." *Journalism, 19*(5), 595–610.
- Hovy, D., & Prabhumoye, S. (2021). Five sources of bias in natural language processing. *Language and Linguistics Compass*, *15*(8), e12432. https://www.dawn.com/news/1736878
- Jamil, S. (2020). Artificial Intelligence and Journalistic Practice: TheCrossroads of Obstacles and Opportunities for the Pakistani Journalists. *Journalism Practice*. https://doi.org/10.1080/17512786.2020.1788412.
- Lecompte, C. (2015). Automation in the newsroom. *Nieman reports*, *69*(3), 32-45.
- Lewis, S. C., Guzman, A. L., & Schmidt, T. R. (2019). Automation, journalism, and human–machine communication: Rethinking roles and relationships of humans and machines in news. *Digital journalism*, *7*(4), 409-427.
- Lewis, S. C., & Westlund, O. (2015). Big data and journalism: Epistemology, expertise, economics, and ethics. *Digital journalism*, 3(3), 447-466.
- Marconi, F., Siegman, A., & Journalist, M. (2017). The future of augmented journalism: A guide for newsrooms in the age of smart machines. *AP Insights*.
- Spangher, A. (2015). Building the next New York Times recommendation engine. *The New York Times*.
- Zamith, R. (2019). Algorithms and journalism. In *Oxford Research Encyclopedia of Communication*.