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Stepping Towards Technological Innovation in Journalism: Barriers for the Use of Artificial Intelligence and Automation in Developing Newsrooms

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Abstract

The impacts of digital technology on news media industry manifest itself in different parts of the world. Many big media organizations, in developed Western countries, are now using AI technology and automation in their newsrooms. This is somehow not the case in developing countries that confront multi-facet challenges to embrace AI-related technological advancements in their news ecologies. This study specifically focuses on the case of Pakistan's mainstream news media. Despite economic and technological constraints, the country's news media is considered as vibrant and vocal within South Asia with massive expansion in the past fifteen years. Nevertheless, it is still in nascent stage in terms of technological advancements in news media industry. Therefore, using diffusion of innovation theory, this study aims to address issues in the adoption of AI technology and automation by Pakistan's mainstream news media. To achieve this aim, this study employs the qualitative method of in-depth interviews. Findings suggests that the adoption of AI technology and automation is not without potential challenges at various stages of the diffusion of technological innovation. The Pakistani journalists from the Urdu language's newspapers, regardless of their age and gender, are substantially resistant to accept technological innovations as compared to their colleagues from television news channels and English-language's newspapers. This study highlights that the Pakistani journalists' lack of awareness and their limited interest into AI-driven transformations underpin their resistance and fear to adopt technological innovations in routine practice. Interviewed journalists, regardless of their gender and age, express their concern that the use of automated journalistic tools can result in job redundancy in local news media ecology. This study highlights other obstacles too for the adoption of AI-driven journalistic practice in Pakistan's mainstream news media including: economic and technological constraints, a lack of journalists' training and an absence of government's strategies and policies to deploy AI technology in news media industry like other sectors in Pakistan, and the country's existing digital divide.

Keywords: Artificial Intelligence (AI), journalism, media, automation.

1. Introduction

In the past few decades, journalism practice has evolved in many ways, changing with the times through print, radio, broadcast, and now digital journalism mediums. More recently, the growth of Artificial Intelligence field has facilitated the news media industry to produce automated journalism (Diakopoulos, 2019a). In many ways, automated journalism is shaking up the news

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media industry in many large-scale Western economies (Jamil, 2020a). Driven by the Natural Language Generation technology (NLG) and AI-enabled software, automated journalism helps to create news stories without journalists' involvement. Thus, automated journalism can be considered as an innovative development in digital journalism, with an increased use of machine-written news stories by many international media giants such as British Broadcasting Corporation, Reuters, Bloomsburg, Finnish Broadcasting Company, The Guardian, Forbes, the Washington Post, the Los Angeles Times, and the New York Times. However, the growing automation in journalism is not just limited to the use of machine-written stories. It is being used by news organizations for diverse purposes including tracing of breaking news, dealing with big and structured data sets, "lead generation, digging-out media insights, news verification for fake news and overall streamlining the workflow of journalists" (Jamil, 2020a: 2; Lewis, Guzman & Schmidt, 2019; Caswell & Dorr, 2018; Hansen et al., 2017). These positive implications of automated journalism have attracted many Western scholars, especially from large-scale economies (i.e., Europe, Scandinavia, the United States and China), to analyze the role of AI in journalism and challenges in the adoption of automated journalism practice (Diakopoulos, 2019; Lewis, Sanders, & Carmody, 2018; Lewis, Guzman & Schmidt, 2019; Caswell & Dorr, 2018; Smith & Eckroth, 2017; Linden, 2017a, 2017b). Nevertheless, very little is known about the issues that are confronted by low income developing countries to adopt automated journalism practice. Therefore, informed by the *diffusion of innovation theory*, this study specifically focuses on the case of Pakistan thereby to address challenges faced by the country's mainstream news media in the adoption of AI technology and automated journalism practice.

2. Diffusion of innovation: A framework to understand adoption of automated journalism in Pakistan

Conceptually, diffusion is the "process by which new products, behaviors, or ideas are communicated among the members of social systems. Diffusion may be spontaneous and unplanned" (Barnet & Vishwanath, 2017: 2). There are three driving elements for the diffusion including: innovation, communication mediums and the social system or context (Rogers, 2003). While these three elements are important for any transformation, diffusion of innovation follows a series of five key stages, namely: "awareness (i.e., knowledge) and interest, persuasion, decision-making, adoption (i.e., implementation), and confirmation" (Atkin, Hunt & Lin 2015, p. 653). Figure, below, illustrates the five stages of diffusion of innovation process.

Figure 1. Five stages of diffusion of innovation process

The main actors in the diffusion of innovation theory are (Halton, 2021, para. 2):

- Innovators: People who are open to risks and the first to try new ideas.
- Early adopters: People who are interested in trying new technologies and establishing their utility in society.
- Early majority: Those who pave the way for use of an innovation within mainstream society and are part of the general population.

- Late majority: Another part of the general population – the set of people who follow the early majority into adopting the innovation as part of their daily life.

- Laggards: People who lag the general population in adopting innovative products and new ideas. This is primarily because they are risk-averse and set in their ways of doing things.

The core strength of diffusion of innovation theory is that it helps to understand the dispersion of any new idea or innovation regardless of the socio-cultural context or system that define the characteristics of the population. Therefore, in this study, the rationale for using this theory is to address diverse challenges faced by Pakistan's mainstream news media in various stages of adoption of automation and AI-technology.

3. The growing automation in journalism

Automated journalism is the use of artificial intelligence, mainly through AI-enabled software and algorithms to create news stories automatically without humans' involvement in the process of news production, except the involvement of programmers who develop the algorithm that allows automation in news gathering and production (Jamil, 2020a, 2019; Dorr, 2016). One key aspect of automated news produced through algorithms is that it allows news production from only digitally structured data and cannot operate with an unstructured data. Now many scholars refer automated journalism as algorithmic or robotic journalism (Peiser, 2019).

Moreover, driven by the Natural Language Generation (NLG), automated journalism enables the news production without a journalist or editor having to come in contact with the news story (Diakopoulos, 2019b). While it can seem like a negative update in the face of what seems to be a declining industry in many parts of world due to economic crises led by COVID-19 pandemic and other factors, it does permit journalists to focus on the more important stories, stimulating the process a little quicker to enable reporters to jump onto a case once it's deemed relevant enough. Additionally, tedious work like data crunching and filtration, can be easily avoided using algorithms and AI-enabled software offering more accurate and detailed information to news consumers. AI-enabled software also can filter fake news, assuring that the stories are as factual as possible, which is essential when readers aren't as quick to fact check with media sources (Newman, 2018).

As aforementioned, there is a growing inclination towards the practice of automated journalism practice in large scale economies of Europe, Scandinavia, the United States and China. For example, in 2016, the Guardian launched its first chat bot via Facebook, which permits users to pick from the U.S., UK and Australian version of Guardian News, and it was designed to deliver selected news stories everyday via Facebook Messenger. Recently, Bloomberg's Cyborg which automatically extracts key data points from earning reports for thousands of companies (Chawla, 2020). Some other prominent examples of the use of automation by news organizations are (Chawla, 2020):

- Yle News Lab at the Finnish Public Broadcasting Company with their smart news assistant Voitto offers its personalized news.

- Wall Street Journal uses an ML-based dynamic paywall for personalized subscription prices based on reading habits.

- Reuters has developed News Tracer and Lynx Insight. Both tools use machine learning and AI technologies to support Reuters journalists in the newsgathering process.

These are some inspiring examples of growing automation mainly from the Western economically developed countries. However, a recent study by the United Nations' Department of

Economic and Social Affairs (DESA, 2017) suggests that "quite little is known about the possible impact of new technologies and artificial intelligence on low-income countries in different sectors" (cited by Jamil, 2020a: 2). When analyzing the case of Pakistan, there is a dearth of qualitative studies that can unpack issues in the adoption of AI-technology and automation by the country's mainstream news media. Hence, this study aims to fill this gap in the literature, so to reflect upon the role of automation in transforming journalistic practice in Pakistan, which is significant to understand the automated journalism practice in similar socio-economic contexts.

4. Method

This study investigates a research question: what are the issues faced by Pakistan's mainstream news media in the adoption of AI technology and automation? This study uses the qualitative method of in-depth interviews to explore this question. Using purposive sampling, the researcher has interviewed 25 working Pakistani journalists (i.e., 15 male and 10 female journalists) between January 2019 and April 2019. The selected male and female journalists are of age ranging between 25 and 65 years, and they are full-time employee of Pakistan's mainstream Urdu and English languages' newspapers and television news channels that operate in Karachi. The reason for choosing purposive sampling is to ensure the representation of male and female journalists from both newspapers and television news channels that operate in Urdu and English language.

Journalists, who have participated in this study, belong to: six English language's newspapers (*Daily Dawn*, *Express Tribune*, *The Nation*, *The News International*, *Business Recorder* and *Daily Times*); three Urdu language's newspapers (*Daily Jang*, *Daily Express* and *Nawa-e-Waqt*); eleven Urdu language's television news channels (Geo News, Express News, SAMAA News, ARY News, AAJ News, Dunya News, Channel 92, Ab Tak News, Dawn News, News One, Pakistan Television Corporation – PTV News).

To ensure the confidentiality and safety of research participants, all interviewed journalists have been quoted using numbers (ranging between 1 and 25). Besides, this study uses inductive thematic analysis to analyze the gathered data. Themes have been distilled in the journalists' responses to the research question and that explains issues for the adoption of AI technology and automation in journalism. The data analysis of this study has been completed between January 2020 and March 2020.

5. Results and discussion

Artificial Intelligence (AI), algorithms, robots, and other technologies are now an essential part of the news media ecosystem, especially in many Western large-scale economies. Therefore, several news organizations (such as BBC, Reuters, The Guardian, Bloomberg, The New York Times, and The Washington Post) and companies (such as Microsoft, Facebook, and Google) are currently investing in artificial intelligence. In this context, AI presents a new media concept, which reflects a significant development in journalism, and which is referred as either automated journalism or robot journalism or algorithmic journalism (Carlson, 2015). Notwithstanding the acknowledged significance of AI in journalism, it is still not easy for news organizations and journalists of low-income and unstable economies to take advantage of AI-enabled devices, software/or programs and automation by virtue of several issues. Interviewed journalists' feedback, in this study, reveals seven major issues for the adoption of automated journalistic practice in Pakistan: (i) resistance by the journalists to adopt AI technology, (ii) economic and technological constraints, (iii) a lack of journalists' training, (iv) data inaccuracy, (v) a lack of access to data, (vi) existing digital divide in Pakistan, (vii) and a lack of effective policy implementation to foster the use of AI technology.

This study finds that the Pakistani male and female journalists, especially from the Urdu-language's newspapers, are more resistant to adopt AI technology as compared to those working in English- language's newspapers and television news channels, and this is mainly due to their less exposure to international collaborative journalistic training and technological innovations. In this respect, an interviewee from an English-language's newspaper, reveals:

> Most journalists, who work in the Urdu language's newspapers, are not aware of technological developments in journalism and they are dwelling in primitive journalistic concepts and practices. This does not mean that rest of the journalists are technology geeks, but their exposure to international trainings and technological innovations is much higher. But still there is a fear among journalists towards the adoption of technology, which is commonly prevalent among all journalists. (Interviewee number 7)

"We are not just culturally conservative, rather we are technologically conservative too. This is particularly evident in the Urdu-language's print media. I see growing interests of journalists into AI-related developments in English-language's newspapers and some television news channels", says an interviewee (Interviewee number 12). These findings suggest that the Pakistani journalists can be categorized as either laggards or early adopters in the diffusion of innovation process.

When speaking about the journalists' resistance to adopt automation, a female television news producer states, "I see fear of innovation among the Pakistani journalists who are already suffering from job loss and salary cuts. So, the resistance is prevailing largely because they view AI technology as a threat to their careers and legitimacy as professional journalists" (Interviewee number 13). The resistance of Pakistani journalists to adopt AI technology by virtue of their fear of losing job is not surprising. This fear is persistent among journalists across the globe as many scholars have warned that artificial intelligence will seep into wide segments of daily life including journalism by 2025 (Ali & Hassoun, 2019; Smith & Anderson, 2014; Bernard, 2013).

Another issue highlighted by the interviewed journalists is related to Pakistan's wobbly economic condition that reflects in a lack of economic resources even in the mainstream big media organizations of the country. For example, director news of a private television news channels highlights:

> After 2018's elections, Pakistan's economy has steadily declined. The impacts of financial crunch are evident on the news media industry too that is starving for economic and technological resources. Basically, media owners cannot afford the luxury of AI technology within their newsrooms. (Interviewee number 17)

Drawing on the diffusion of innovation theory, this study finds that the acceptance of AI technology is not just constrained because of the journalists' resistance and a lack of economic resources in Pakistan's news media. Journalists' level of awareness towards the basic concepts of automation and its implications is also very limited. For instance, according to an interviewee:

> Journalists' trainings are not so often that create awareness about automation in journalism, digital safety issues associated with the use of AI-enabled technology, financial repercussions of introducing AI technology and so on. The first step is fostering knowledge and interest. The Pakistani journalists face digital surveillance and risks on daily basis. This is a fear that restrain them to explore technology-related options to transform their practices. We need to tell them how to safely use automation and AI-enabled tools. (Interviewee number 5)

Digital risks and surveillance are common problems for the Pakistani journalists across the country (Jamil, 2021a, 2021b). This study suggests that the Pakistani journalists fear about digital risks, as well as they are reluctant to use automation tools and AI-enabled software

viewing as posing more digital risks to them. "Journalists are not aware about the concepts of algorithms, terms like Natural Language Generation and so on. And given their level of awareness is poor their interest level is also low to accept any AI-driven innovations", says a male reporter of a private television news channel (Interviewee number 9). This implies that the adoption of AI technology and automation is blocked even at the very first two stages of diffusion – awareness and interest. However, it is important to look at other factors that impinge on the journalists' interest to adopt automation. Journalists' responses indicate three pressing issues of data inaccuracy, a lack of access to data and Pakistan's existing digital divide for the practice of automated journalism. For example, a senior correspondent of an English-language's newspaper states:

> You cannot always blame a journalist for lacking interest and awareness of technology. My male and female colleagues have received training of data journalism and digital journalism from renown international institutions including Reuters Institute (UK), CNN and Columbia School of Journalism. When they return to Pakistan, they end up dealing with planted and manipulated news stories from various sources. You cannot have a direct access to sensitive information in Pakistan that ranges from news related to security matters and national defense. We do not have access to reliable data. (Interviewee number 19)

When talking about the impact of digital inequalities for the adoption of automation in journalistic practice, an interviewee states:

> The gap, between haves and haves not, is wide in terms of access to the Internet and skills to use it and technological devices. And these digital inequalities can be seen within news media industry as well. I would not name the newspaper, if you visit one of the influential Urdu language's mainstream newspapers of Pakistan, you will shock to see the technological resources there. You would find staff working manually there with a paper and pen…Is it not shocking in this digital age? The situation of ethnic news media outlet is shabby. But many journalists are fine with this situation. Pakistan needs to develop as a digital society. We need to bridge these digital inequalities. Then we would see a shift in journalists' attitude to accept technological innovations. (Interviewee number 16)

Digital divide continues to affect nations in different aspects (Jamil, 2020; van Duerson & van Dijk, 2018). Particularly, with the onset of COVID-19 pandemic, concern related to technology 'haves' and 'haves not' has grown in prominence in the countries of the Global South that are witnessing an increased digital divide. The impacts of digital inequalities on journalistic practice are also gaining scholars' attention. In many developing countries of the Global South, the journalists' access to the Internet and digital devices (including smart phones, laptops, AI-enabled software) and their digital skills remain a constraint for bringing technological advancements in the newsrooms (Jamil, 2022).

Given that automated journalism relies on digitally structured data, the issues of data inaccuracy and a lack of access to data can affect the media owners' decision-making to adopt AI-software and programs. Finally, the process of diffusion of innovation requires confirmation of adoption, which is not very foreseeable in the case of Pakistan's news media. "The current government has no practical strategies for use of AI technology at least in the news media industry", reveals a news producer of a state-owned television news channel (Interviewee number 23). Interestingly, now Pakistan has started planning to develop the country's AI market to reach the global markets. This is followed by Pakistan's Presidential Initiative for Artificial Intelligence & Computing (PIAIC) that was launched in December 2018. The key goal of PIAIC is to technologically advance the country for revolutionizing education, research, and business, and thereby to prepare the country for the fourth industrial revolution (Awan, 2019). This suggests some hope at least at decision-making and confirmation stages for the diffusion of technology and adoption of automation in Pakistan's news media industry. However, any initiative by the

Pakistani government needs to consider that no diffusion of innovation occurs merely with decisions of adoption. It is a process that begins with the creation of awareness and interest among stakeholders followed by the constant persuasion.

6. Conclusion

This study unpacks diverse challenges in the adoption of AI technology and automation in Pakistan's mainstream news media. Interviewed journalists' responses suggest seven key issues in this regard including: (i) resistance by journalists to adopt AI technology, (ii) economic and technological constraints, (iii) a lack of journalists' training, (iv) data inaccuracy, (v) a lack of access to data, (vi) existing digital divide in Pakistan, (vii) and a lack of effective policy implementation to foster use of AI technology. Drawing on the diffusion of innovation theory, this study reveals the Pakistani journalists as laggards and early adopters of AI technology. A wide majority of the Pakistani journalists, especially from the Urdu-language's print media, are bound by tradition and conservatism. Consequently, they are very skeptical of AI-driven technological transformations in the local news media. This study also highlights a segment of Pakistani journalists, who are early adopters of technology, and who try to develop awareness and interest into AI and automation in journalism. Data suggest that such journalists mostly work for English-language's print media and some influential television news channels.

Further, this study suggests that the Pakistani journalists stand at the first stage of diffusion of AI technology (i.e., awareness and interest stage). At the decision-making stage (i.e., the second stage), a multi-stakeholder approach is required for the effective implementation of policies related to the deployment of AI technology in the local news media. Subsequently, it is crucial to devise legal and ethical frameworks that consider technological transformations in journalism and address legal issues (such as liability) and ethical issues of impartiality, bias, and accuracy. This shall help to integrate the adopted technology and to review the significance of its adoption.

To sum up, the author emphasizes to consider the knowledge-attitude-practice gap (KAP-gap). It refers the situation in which individuals have gained awareness and knowledge and have developed a positive attitude towards it, but they do not practice or act upon it. As aforementioned, the Pakistani journalists are early adopters of AI technology and automation in journalism. They try to create technological awareness and demonstrate some level of interest too. Nevertheless, it is important to explore the gap between knowledge and practice thereby to evaluate the future of AI-driven journalistic routines and automated journalism in Pakistan.

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