Experts' Perception of Artificial Intelligence Knowledge in Egyptian Newsrooms

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ABSTRACT

As artificial intelligence technologies are emerging and changing various fields including journalism, it is important to understand the extent of AI knowledge that newsrooms have. This study explores the perceptions of experts regarding artificial intelligence (AI) knowledge in Egyptian newsrooms. It employs the AI readiness and AI adoption model which includes the phases of AI adoption and five variables that affect the adoption process. Through in-depth interviews, the research focuses on the AI knowledge variable which includes several aspects: AI awareness, upskilling efforts, and ethical concerns among journalists and managers in organizations integrating AI. The study reveals a lack of comprehensive understanding of AI within news organizations. Upskilling initiatives vary among organizations. Experts call for regulations and ethical guidelines to face ethical concerns including accuracy, copyrights, bias, and privacy invasion. The study emphasizes the urgency of addressing AI literacy and training while managing the ethical implications of AI in journalism.

Keywords: Artificial Intelligence (AI), AI Journalism, AI Ethics, AI Knowledge.

1. INTRODUCTION

Artificial intelligence (AI) presents a complex concept that challenges comprehensive understanding due to its intricate mathematical algorithms and wide-ranging societal implications (Cacciatore et al. 2012 as cited in Zhai et al. 2020). Diverse definitions of AI have been proposed by researchers over time. The Dartmouth Research Project, for instance, defined AI as enabling machines to exhibit intelligent behavior akin to human actions (McCarthy et al. 2006). Similarly, cognitive scientist Marvin Minsky framed AI as the science of replicating human-like intelligence in machines (Fjelland 2020).

A more elaborate definition, as suggested by the United Nations' Information Economy Report (UNCTAD 2017), "The ability of machines and systems to acquire and apply knowledge, and to carry out intelligent behavior. This may involve performing various cognitive tasks, such as sensing, processing oral language,

reasoning, learning, and making decisions. Intelligent systems combine big data analytics, cloud computing, machine-to-machine (M2M) communication and IoT in order to operate and learn. Currently, AI is confined to relatively narrow, specific tasks, far from the kind of general, adaptable intelligence that humans possess". Shekhar (2019) perceives AI as the science empowering computers and machines to learn, judge, and engage in reasoning autonomously.

As a general-purpose technology (GPT), AI holds transformative potential and presents novel business opportunities (Iansiti and Lakhani 2020). The integration of AI has significantly altered journalism, evolving beyond auxiliary support to generating content with minimal human intervention. This phenomenon has led to specialized terms such as "Automated Journalism" (Carlson 2015), "Algorithmic Journalism" (Napoli 2014), and "Robot Journalism" (Clerwall

2014). Algorithmic Journalism involves structured data converted into narratives via Natural Language Generation (NLG), offering economic benefits by reducing production costs (Dorr 2016).

Contemporary journalism extensively employs AI throughout the news production cycle. Machine learning aids in data analysis to uncover patterns that inform story discovery. AI technology assists in template-based story creation, enabling computers to autonomously generate data-driven articles. Furthermore, AI facilitates personalized story recommendations based on readers' preferences. Notable news organizations like The New York Times and The Washington Post have harnessed AI to expedite research, data analysis, and news generation (Underwood 2019; Goni and Tabassum 2020).

The emergence of AI in communication has prompted a need for AI literacy among stakeholders, including newsroom managers and journalists (Jamil 2021). This study aims to explore experts' perceptions of AI knowledge in Egyptian newsrooms, shedding light on their awareness of the dynamic changes AI brings to journalism, the needed upskilling for personnel, and the ethical concerns surrounding this new technology by employing the AI-Readiness and the AI Adoption Process Model (Jöhnk, Weißert, and Wyrtki, 2021) which includes the five organizational AI readiness variables that affect the AI adoption process in organizations. This study focuses on the AI knowledge variable. This variable has three aspects: AI awareness, upskilling, and AI ethics.

1.1   Research Problem

As the media landscape undergoes transformative shifts propelled by technological advancements, the integration of Artificial Intelligence (AI) emerges as a pivotal force. While global trends underscore widespread AI adoption in journalism, there remains a significant gap in understanding how Egyptian journalists and newsroom managers navigate this technological transition. This study bridges existing literature gaps by delving into nuanced aspects of AI knowledge within Egyptian newsrooms. By examining awareness levels, upskilling initiatives, and ethical considerations specific to AI, the research aims to offer insights regarding the current awareness and skill level that inform strategies for enhancing AI literacy, ethical practices, and skill development among Egyptian media professionals. The research serves as a catalyst for advancing scholarly discussions on AI adoption within the Egyptian journalism context, providing practical implications for the evolving media landscape in the region.

1.2   Research Significance

This study is important because:

- AI technologies are the current trend around the world and are changing various fields.
- It would contribute to bridging the gap between AI research in Egypt and international AI research.
- It sheds light on the extent of AI knowledge in Egyptian news organizations.

1.3   Research Objectives

This study aims to:

- Analyze the extent of artificial intelligence knowledge in Egyptian newsrooms.
- Examine managers' and journalists' AI awareness in Egyptian news organizations.
- Inspect AI upskilling efforts to adapt employees' abilities to using new tools.
- Explore professional's ethical concerns regarding the adoption of artificial intelligence in Egyptian newsrooms.

2.   LITERATURE REVIEW

2.1   Artificial Intelligence Knowledge

According to Deuze and Beckett (2022), AI literacy refers to the ability to understand and critically engage with artificial intelligence (AI) technologies, encompassing knowledge of AI concepts, applications, ethical considerations, and societal implications. It enables individuals to make informed decisions, assess information reliability, and participate meaningfully in discussions about AI's impact on society.

The integration of artificial intelligence (AI) into contemporary technologies is progressively extensive. Nevertheless, comprehending the intricate workings of AI and algorithms can pose a considerable challenge, particularly for non-technical users (Long and Magerko 2020). This knowledge deficit may impede their capacity to engage with artificial intelligence effectively, particularly in critical roles (Eslami, et al. 2019). Furthermore, it has the potential to result in misguided policy formulation and regulatory efforts (Stone, et al. 2022).

Scholars have presented compelling arguments in favor of fostering an extensive comprehension of AI and its applications across various professional domains, with

journalism included (Long and Magerko 2020; Deuze and Beckett 2022). This literacy should be intricately linked to diverse dimensions of the news production process, while also considering the unique challenges confronted by journalists within their sphere of work (Cai and Nishal 2023).

Long and Magerko (2020) argue that AI literacy should encompass various dimensions, including critical thinking, ethical considerations, awareness of AI's societal implications, and practical knowledge. This critical awareness can serve as a valuable means of mitigating the diverse manners in which artificial intelligence tends to exacerbate social and digital disparities when entrusted to technology corporations (Deuze and Beckett 2022).

As previous studies mentioned, AI knowledge includes the aspects of AI awareness, upskilling, and AI ethics:

2.1.1   Artificial Intelligence Awareness
AI awareness involves grasping the abstract cognitive functions of AI, enabling employees to recognize its versatile capabilities and potential applications within their specific contexts or industries (Hofmann et al., 2020). Research suggests that the current state does not show high levels of awareness, as organizations and institutions try to gather information about this technology, which could not be easily available or accessible (Hamm & Klesel, 2021). Additionally, Mousa and Abdulfatah (2020) point out that professional challenges, such as lack of knowledge and awareness in news organizations hinder their integration of AI technologies. Attia (2019) attributes this deficiency in awareness to journalists' negative perception of AI and their reluctance to embrace it.

Furthermore, Abdel-Hamid (2020) agrees that there is not sufficient awareness about AI and its uses, which he also stated is the reason behind the relatively late beginning of this field in Egypt. Nevertheless, he states that users' perception of AI is positively affected by their knowledge and understanding of its tools and applications especially in younger generations such as university students. This aligns with the findings of Goni and Tabassum (2020) that undergraduate journalism students are mentally ready to learn and adopt AI which they think will have unlimited personal and professional benefits.

2.1.2   Upskilling
The concept of upskilling involves cultivating interdisciplinary competencies essential for the effective implementation of AI projects, encompassing areas such as statistics, data management, analytics,

and specialized domain knowledge, as emphasized by Pumplun et al. (2019). This highlights the necessity for educational initiatives and training programs aimed at equipping journalists with the requisite skills to collaborate proficiently with AI technologies as suggested by Attia (2019) and Abdel-Hamid (2020) who also calls for the establishment of research institutes and a dedicated ministry for AI.

These findings align with those of Mousa and Abdulfatah (2020), who identified a dearth of AI skills within organizations due to inadequate training, further emphasizing the urgency of educational interventions. Additionally, El Beheiry's (2022) research substantiates these earlier studies by identifying numerous challenges hindering AI integration, particularly in the realm of training.

2.1.3   Artificial Intelligence Ethics
Jöhnk, Weißert, and Wyrtki (2021) argue for the inclusion of AI ethics within the broader understanding of artificial intelligence knowledge, a viewpoint shared by Deuze and Beckett (2022), as previously mentioned. The discourse surrounding artificial intelligence (AI) has been primarily focused on concerns related to algorithmic bias, transparency, and personal data privacy. Whittlestone et al. (2019) emphasize the necessity of employing machine learning in a fair and ethical manner, particularly when it influences decisions about individuals. In the context of journalism, AI applications have intensified these concerns, giving rise to ethical challenges such as the erosion of creativity, bias, transparency, fairness, and data utilization, among others (Ali and Hassoun 2019).

A significant challenge in the realm of AI ethics revolves around the utilization of consumers' data without their informed consent, giving rise to ethical and legal dilemmas. The unauthorized use of data not only breaches ethical norms but also carries legal consequences, especially concerning privacy infringement in accordance with cybercrime laws (Farag 2022). Striking a balance between harnessing AI's potential and safeguarding user data privacy remains a critical concern. Additionally, the meaningfulness of user consent is a crucial issue, given that users may not fully comprehend the extent of data usage and the temporal scope of their consent (Whittlestone et al. 2019). Consent should not be presumed to be permanent, as individuals' privacy preferences may evolve over time, with younger generations displaying greater willingness to share data compared to older ones (Goldfarb and Tucker 2012).

The concept of data persistence adds complexity

to the issue, as digital data, once created, cannot be entirely erased, leading to uncertainties regarding future data usage. Obtaining consent for data creation and its subsequent utilization becomes more challenging when individuals cannot anticipate how their data might be repurposed or the predictions that may arise from such repurposing (Goldfarb, Gans and Agrawal 2019). Privacy versus personalization presents another ethical dilemma, as the collection of digital traces left by users online can enhance service quality through personalized recommendations but raises concerns about privacy and individual autonomy (Baron and Musolesi 2020). Achieving data personalization success requires users to feel a sense of control or ownership over their data, even if such control is ultimately illusory (Tucker 2014; Athey, Catalini and Tucker 2017).

Addressing issues of fairness and equity is a challenge when using algorithms to enhance prediction accuracy. Algorithms may unintentionally discriminate against certain minority groups, especially when using simplistic quantitative methods for complex assessments like human behavior (Jobin, Ienca and Vayena 2019). Balancing accuracy and fairness pose a daunting task, as algorithms may sometimes outperform human judgment, particularly when human decisions are influenced by systematic biases (Whittlestone et al. 2019).

Privacy spillovers introduce an additional layer of complexity, as data collected for one purpose can inadvertently generate data about individuals who are unaware of their data being recorded in public spaces (Goldfarb, Gans and Agrawal 2019). Moreover, AI technology's ability to amalgamate data, including information users did not consent to disclose, raises concerns about its intrusive nature (O'Neil 2017).

In response to these ethical challenges, various organizations and institutions have endeavored to establish principles and codes of ethics for artificial intelligence. These guidelines emphasize the importance of using AI for the common good, avoiding harm to individuals, respecting their rights, and upholding fundamental values such as fairness, privacy, and autonomy (Whittlestone et al. 2019; Jobin, Ienca and Vayena 2019). These principles have been distilled into core concepts, including beneficence, nonmaleficence, autonomy, justice, and explicability, drawing from the well-established tradition of biomedical ethics (Whittlestone et al. 2019).

2.3   *Artificial Intelligence in Egypt*

Although Egypt initially lagged in recognizing the significance of the field of Artificial Intelligence (AI), as evidenced by the establishment of its AI council in 2019, it has undergone a transformative shift due to the government's commitment to a digital future (Abdel-Hamid 2020). Recognizing the pivotal role AI is expected to play in Egypt's economy, the Ministry of Higher Education projects that AI will contribute 7.7 percent to the country's GDP by 2030, leading to the establishment and enhancement of 350 AI-focused institutions, including the Knowledge Hub in the New Administrative Capital. Moreover, Egypt has introduced advanced programs designed to bolster expertise in AI, covering essential domains such as machine programming, smart robotics, and data science (Farag 2022).

A significant milestone occurred in the final quarter of 2019 when the Ministry of Higher Education and the Ministry of Communication outlined the foundations of a national AI strategy, with education serving as one of its key pillars (Abdel-Hamid 2020). Furthermore, Egypt's active involvement in shaping an Arab AI strategy and establishing an AI academy highlights its commitment to fostering creativity, enhancing skills in the AI domain, and creating exportable AI solutions (Farag 2022).

In November 2019, the Egyptian government took a remarkable step by forming the National Council for AI, a partnership between governmental institutions, distinguished academics, and practitioners from leading AI businesses, with the Minister of Communications and Information Technology serving as its chairperson (Amer 2021). The Council is entrusted with the responsibility of formulating, executing, and overseeing the national AI strategy in close collaboration with experts and relevant entities (Abdel-Hamid 2020). Its role extends to monitoring best practices for implementing the national AI strategy, setting national AI priorities, and offering policy recommendations and technical, legal, and economic frameworks in the AI domain. Additionally, the council facilitates regional and international cooperation to exchange expertise in the field with other countries and organizations (Ministry of Communication and Information Technology Website n.d).

Several private companies have actively engaged with AI technologies in Egypt, showcasing its increasing integration into various sectors. Synapse Analytics, a company specializing in AI solutions, is actively working on the implementation of robotics across

different sectors within the Egyptian market, with applications in image tracking and analysis, banking services, and business analytics (Abdel-Hamid 2020; Amer 2021). Additionally, Vodafone, in collaboration with IBM, leverages AI chatbots in customer service interactions, thereby enhancing customer satisfaction through personalized assistance and automated solutions that substantially reduce interaction time (Abdel-Hamid 2020; Amer 2021).

While AI's adoption in the Egyptian media landscape remains relatively limited, some notable institutions have made strides in its application. The Sarmadi group, the owner of Filfan, employs AI chatbots to inform users about program schedules across 30 Middle Eastern channels, leading to a remarkable 50% increase in Twitter followers and a 20% boost in website traffic (Amer 2021). Cairo 24, in partnership with the Egyptian stock market and the Ministry of Communications, has initiated an innovative project that employs AI to generate news content autonomously, relying on software for crafting economic news (Farag 2022). Additionally, Alwatan employs advanced technology to monitor user behavior during website browsing, underscoring a commitment to AI integration in their operations (Farag 2022).

3. THEORETICAL FRAMEWORK

In this research, the framework proposed by Jöhnk, Weißert, and Wyrtki (2021) is utilized to examine the integration of AI readiness within the AI adoption process. The study delineates three distinct phases of AI adoption: initiation, adoption decision, and implementation. Moreover, the investigation underscores the influence of various organizational AI readiness factors on this process, categorizing them into five principal domains: strategic alignment, resources, knowledge, culture, and data.

This paper focuses on the knowledge category which includes AI awareness, upskilling, and AI ethics, as organizations need to have sufficient knowledge about this technology before considering its adoption in their work routine.
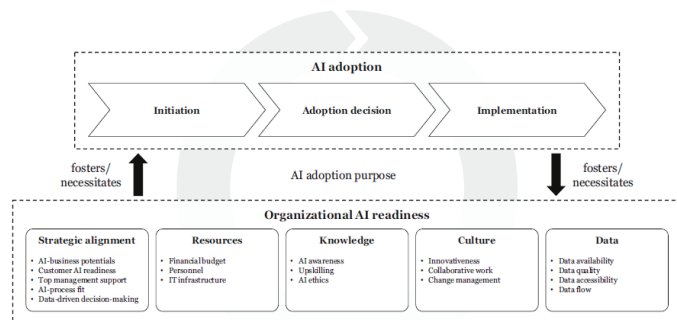

Figure 1: AI-Readiness and the AI Adoption Process Model

This conceptual framework represents an advancement upon two earlier models within the field. The initial model, introduced by Alsheibani et al. (2018), delves into AI readiness utilizing the Technology-Organization-Environment (TOE) framework, asserting that heightened AI readiness positively correlates with the success of AI adoption (Alsheibani et al. 2018). The second model, developed by Pumplun et al. (2019), also incorporates the TOE framework to explore AI readiness while integrating AI-specific factors. Notably, these earlier models focused on singular aspects, either the adoption process or the organizational elements. In contrast, the model presented in 2021 by Jöhnk, Weißert, and Wyrtki synthesizes both preceding models. It comprehensively elucidates the adoption process concerning the presence or absence of AI readiness factors within organizations, elucidating the profound impact these factors may have on the AI adoption process (Jöhnk, Weißert, and Wyrtki 2021).

4. RESEARCH DESIGN

4.1 Research Questions

In this study the researchers try to examine the following research questions:

RQ1: How aware are managers and journalists of artificial intelligence applications in journalism?

RQ2: What are managers' and journalists' perceptions towards upskilling?

RQ3: What are the potential ethical concerns of integrating AI in Egyptian newsrooms?

4.2 Method

In this study, an in-depth interview approach was employed as the qualitative research method. The study focused on a non-probability purposive sample, including academic and field experts experienced in both AI and media, as well as managers and journalists from four distinct organizations that have integrated AI into their operations: Cairo 24, Al Masry El Youm, Masrawy, and FilGoal. Field and academic experts were chosen to give a comprehensive view regarding the current state of artificial intelligence technologies in journalism, and the general ethical concerns facing this integration. As for the organizations, they were chosen as previous studies indicated that they have attempted AI integration in their news production process.

The qualitative method was selected primarily because of the nascent stage of AI integration in the context of Egyptian newsrooms. Previous research indicated a lack of comprehensive understanding and limited instances of AI implementation within organizations. By utilizing qualitative interviews, the study aimed to delve deeply into the perceptions and experiences of experts and professionals in the field. These interviews were instrumental in gaining comprehensive insights into the existing state of AI knowledge within Egyptian news organizations.

4.2.1   Data Analysis

As the study employs a qualitative method which is in-depth interviews, the respondents' answers are analyzed quantitatively in terms of the AI knowledge variable that includes different aspects which are AI awareness, upskilling, and AI ethics. The results are then compared to assess managers' and journalists' AI awareness, upskilling efforts, and to analyze AI ethical concerns.

5.   FINDINGS

5.1   AI Awareness Aspect

The first aspect related to knowledge in this study is AI awareness, which has been found to be lacking in current journalistic organizations, according to Dr. Aly Fahmy, Dean of College of Artificial Intelligence at the Arab Academy for Science, Technology & Maritime Transport. Maha Salaheldin, head of the data journalism unit at Masrawy, Odai Ibrahim, AI Manager at Cairo 24, and Ahmed Fawzy, Editor in Chief at FilGoal, also echoed this sentiment despite working in organizations that had integrated artificial intelligence in different capacities, indicating that journalists across various organizations are not adequately aware of the potential applications of artificial intelligence in journalism. Notably, Salaheldin mentioned that approximately 50 percent of journalists in her organization possess some level of awareness regarding AI and are willing to incorporate it into their work. Ibrahim further highlighted that most journalists in his organization have a preliminary level of awareness due to their exposure to AI integration, and they plan to enhance this awareness in the future.

Mohamed El Mishtawy, Journalist and Trainer also stated that most journalists lacked sufficient AI awareness, in his opinion individuals working in marketing demonstrated a higher level of AI awareness and were more appreciative of its potential benefits. In contrast, journalists often perceived AI as a threat

that might replace them and eliminate their jobs, a sentiment expressed by Mahmoud Kamal, Journalist at Cairo 24, and supported by other interviewees. Kamal argued that such replacement is unlikely to occur in Egypt due to the current limitations of AI technologies in fully taking on human roles, a notion agreed upon by Shaimaa Shaaban, Development Manager at Al-Masry Al-Youm, who emphasized the continued need for journalists to provide analysis and depth to content generated by AI.

In the context of job prospects, Ashraf Gehad, Managing Editor at Masrawy, pointed out the likelihood of downsizing in newsrooms, as AI could potentially streamline tasks that previously required a larger workforce. Nonetheless, opportunities are expected to emerge for those who can adapt to the rapid developments in AI technology. Dr. Fahmy highlighted that creating awareness could be facilitated by preparing the workforce for new AI-related jobs, thereby counterbalancing the potential loss of traditional jobs as technology advances.

Regarding the extent of AI's capability to replace human journalists, Ibrahim emphasized that certain skills unique to human beings, such as converting an angry source's statements into professional content, cannot be fully replicated by AI. Dr. Mohamed Hegazy, Senior Public Policy Consultant & Former Chairman of the Legislation and Laws Committee at the Ministry of Communications and Information Technology also agreed that while AI cannot entirely replace humans, there are specific areas where AI implementation would be more advantageous, such as in hazardous situations like the Covid-19 pandemic, where robots and machines could aid medical staff in quarantine or during accidents until additional help arrives. Similarly, Ammar suggested that AI and robots could be utilized in war and conflict reporting to mitigate risks to journalists.

From a contrasting perspective, Mahasen El Senousy, Journalist at Al-Masry Al-Youm, observed that journalists, particularly from younger generations, do not share the same concerns and reservations about AI technologies. However, she noted "they do not have the necessary funding to use it", rather than a genuine rejection of its potential. In agreement, Ashraf Gehad acknowledged that younger generations generally exhibit greater awareness and acceptance of AI, whereas older generations may struggle to comprehend its practical benefits for their work.

Furthermore, Alexandre Sayad, Media Literacy Specialist, highlighted an additional concern, indicating that journalists are often unaware that many tools

commonly used in their daily routines, such as searching and recommendation systems, are already powered by AI.

5.2   Upskilling Aspect

The rapid advance of technology demands that employees develop their skills to be able to adapt to the ever-changing job market and the constantly evolving technologies like deep fakes that have become more realistic and generative AI that is helping people with different tasks, that is why upskilling is an important variable as stated by El Mishtawy. Dr. Samar Aly, Lecturer at the Faculty of Mass Communication at Suez University, said that training journalists to use these tools is one of the main obstacles of adopting AI. To address this, she thinks workshops could help upskill employees, constant training, and allocating fundings for this could all contribute to solving the problem. Bandar Al-Arqoub, CEO & Entrepreneur, also said that his organization is doing workshops to upskill his employees regarding AI tools.

El Mishtawy suggested that any journalist that wants to continue working in this field would need to gain programming skills, which was already a requirement more than 7 years ago in a job posting he saw at the New York Times, a notion echoed by Khaled Ammar, Metaverse Journalist & Media Trainer. This skill could help journalists leverage big data in their investigative reporting as sometimes data sets are not available, so journalists need to create their own databases and learn to use artificial intelligence to help them analyze it.

Odai Ibrahim agreed that journalists that want to continue in this field cannot be outdated, which means they need to gain new skills to adapt to the changing market, or else their organizations would let them go because their repetitive jobs will be assigned to AI. Regarding their own plans, Ibrahim stated "Our journalists have gone through different trainings, but we still have not satisfied the AI part", but they plan on increasing their focus on this because they do not have a lot of employees, however they are able to maintain the website because AI helps them in their job, so they need to be able to use it. As for FilGoal, Fawzy said that they always invest in training their employees to enhance their skills and provide financial support for those seeking courses that have not been provided by the organization. He added that when the organization decides to integrate more AI applications, they would offer their journalists courses that train them on the new tools.

However, Mahasen El Senousy expressed skepticism about journalists' willingness to enhance their skills, attributing it to a lack of initiative and perceived lack of necessity. Despite this, she said that Al-Masry Al-Youm still is considered an organization that believes in development and training as affirmed by Shaimaa Shalaby the development manager at the same organization. They both said that the organization provides different training opportunities to its journalists. Masrawy is another organization that provides the same opportunities according to Maha Salaheldin and Ashraf Gehad. Salaheldin stated that her organization sends her to take courses then come and train other journalists, they also have plans to partner up with other organizations that offer courses on AI in journalism. Gehad mentioned that there was training with Google on their tools, and other workshops on data journalism. Despite these opportunities, some journalists fail to capitalize on them due to time constraints and a lack of motivation as they do not continue learning or using these tools after the workshops end, according to Gehad. Salaheldin said "sometimes it is out of their hands", she explained that they have full schedules which take time and energy, so they do not have any left to invest in learning something. On the other hand, she mentioned that even when provided with specific time off work for training some journalists still do not have the will to go through the process. The prevailing focus on monthly salaries was acknowledged by Ammar, he said "many journalists only care about the salary they're getting at the end of the month", they are not willing to be more creative or learn anything.

The responsibility for upskilling was deemed a shared endeavor by Gehad who said, "It is a shared responsibility among the government, the syndicate, the news organizations, and the journalists". He explained that they all need to work together, and if one of them is not involved enough the others are more likely to fail. Sayad agreed, emphasizing the need for lifelong learning supported by government attention as the economy depends on it, along with the involvement of academic and private institutions. In addition, it is also the individual's responsibility to not stop learning at any stage of their lives.

Contrasting viewpoints were offered by Mahmoud Kamal, suggesting that not all journalists need to work with AI directly, and that it is enough if they have awareness of their existence because these tools do not require a lot of employees to work with them. Kamal cited examples of successful websites with minimal staff involved in content creation such as Universal, an Indian website that presents news in a gamified and creative manner, however only 8 people

work on its content. He continued that in Cairo 24's trial there were only very few journalists that entered the templates and data to the program, and the program does the rest.

To address the widening skills gap, El Mishtawy and Sayad emphasized the importance of lifelong learning to remain relevant. They highlighted the availability of affordable online courses and the need to start learning incrementally, addressing specific skills as the need arises. Sayad cautioned that rapid technological advancements make reskilling challenging, as the time required may be superseded by newer AI applications. He explained "So if my job is replaced by AI and I go to a reskilling course for a new job, by the time I am done there could be another AI application that replaces me, and I need to be reskilled again".

Various experts discussed the importance of starting reskilling during college years. Dr. Fahmy stressed the need to develop the education sector, highlighting the use of ChatGPT in answering exams without requiring actual learning. Good English language skills, problem-solving abilities, and understanding the fundamentals of AI were emphasized by Dr. Fahmy and Dr. Nehad Omar. Python proficiency and knowledge of AI concepts such as machine learning and deep learning were also recommended. El Mishtawy criticized universities for failing to bridge the gap between education and the job market, advocating for updated curricula that address AI applications. Similarly, Alexandre Sayad, a media literacy specialist, emphasized the need for universities to embrace new perspectives on communication, because it is not mass media anymore, it is peer to peer. Universities need to introduce new concepts to media literacy regarding AI and algorithm literacy, and rebuild curricula using new contemporary theories, according to Sayad.

5.3   AI Ethics Aspect

An essential variable in the knowledge of AI category is AI ethics, Mohamed El Mishtawy said that journalists need to be aware of the ethical uses of AI, and one of the things he teaches in his ethics training is using another artificial intelligence application that reviews AI generated content and shows the original sources of this content, this helps journalists avoid plagiarism and lawsuits. He also highlights the importance of fact checking any material generated by AI to make sure that all the information is real, which Salaheldin also asserted was important. She also pointed out that it is essential to understand who created the tools journalists are using and how they gather data to make sure they work in an ethical manner. Similarly, Aly

said that verifying information generated by artificial intelligence to ensure its accuracy helps uphold accountability of news organizations that employ it.

Dr. Mohamed Hegazy said "There are several important aspects regarding the ethical concerns surrounding AI. One of them is the accuracy of the input, and the other is copyrights". He elaborated that the inaccuracy of the input could lead to misinformation and fake news, which is a shared concern by Alexandre Sayad. Ammar gave an example about fake news generated by AI of some of the images that were trends on social media like images of King Charles celebrating his coronation and the Pope wearing casual clothes. Additionally, the accuracy of the input could lead to misinformation especially with younger audiences that have not been trained to verify the information they gathered, as Ammar explained. Moreover, the generated content could be taken from other existing material, so in this case this raises a question regarding who has the copyright of the generated content, as Hegazy proposed. This has generated lots of debate as Hegazy stated because there are several points that need to be taken into consideration. For example, who was the owner of the input data, it could be the organization and it could be online data that was created by many people that you could not track down. He emphasized that in the end machines do not have copyrights. Moreover, he said that this could become clearer in the future through real cases like when a person sues an organization for using AI generated content based on material they created, then we would be able to understand more about the guidelines that could be put to regulate this. Sayad also commented on the ownership debate, he said "there is a culture of remix on the internet", he explained that with remixing the content it now belongs to the written prompt, despite that it still needs to be known who created the original content to protect their rights.

Despite El Mishtawy's emphasis on the potential of AI, he said that it is important to have human supervision over artificial intelligence, like revising the code regularly and to correct any wrong information because in the end human beings are the ones responsible, which is a notion that Odai Ibrahim, Ahmed Fawzy, and Dr. Samar Aly agreed with and highlighted during their interviews. Sayad stressed the same point that human supervision is needed to filter out mistakes. Ibrahim said, "more technology means more responsibility", he explained that the more advanced the organization is the more it is responsible for making sure they uphold high standards in everything they publish because in the end they are the ones that input the data, so they are responsible for the outcome. Fawzy indicated the same idea as he said that human supervision could

help eliminate any inaccuracies or fake information created by AI. Gehad also stated that many problems could arise from the complete automation of news publishing as it could lead to inaccuracy, and publishing stories that do not abide by the editorial policy, which could reflect negatively on the organization's image. Mahmoud Kamal also concurred that machines could not be held accountable and that it is the responsibility of the humans operating them, and that AI is a tool, it does not lie, the people using it are the ones that could lie.

Bias is another concern that different interviewees addressed, and regarding that Mahmoud Kamal said bias already exists within organizations and that it is how it gets incorporated in the algorithms. An example of that is what they did in Cairo 24, he explained that the Stock Market management opposed any negative connotations in the generated news, so they had to find other synonyms to use that were not negative, this bias did not affect the information itself, the numbers were still correct, however the used terms reflected a more positive manner. Ibrahim stated that bias did appear at the beginning of their trial, however they were able to overcome it by reviewing their input and using more accurate vocabulary. Dr. Hagazy agreed that bias is a major concern, and that its consequences are not limited to journalism, rather this could affect all the AI applications in other areas like recruitment, law, and other. Alexandre Sayad agreed that bias affects the whole society and could be faced by teaching critical thinking. Furthermore, he explained that there are two kinds of bias, the first one is the human bias that exists when developing the algorithm which Kamal mentioned earlier. The second type is worse according to Sayad, which is the bias that develops when the algorithm starts to learn by itself, and this type could not be discovered because it has lots of layers. He said that the only way to solve it is to stop the algorithm and begin from the start, which was a solution proposed also by El Mishtawy.

Dr. Samar Aly added that the decline of creativity in writing and the dominance of a similar writing style across all organizations that use AI generated content is another concern that needs addressing.

Mahasen El Senousy had a different opinion, she said "journalists are using ethical concerns as an excuse to avoid using AI". However, she agrees that artificial intelligence applications are still in the testing phase which means they are not 100 percent accurate, so they need to be integrated slowly while monitored by journalists until they reach a trusting phase.

Sayad proposed another concern which is that AI narrows users view of the world he said, "AI is a mediating our view of the world, so personal bubbles and echo chambers are two phenomena related to AI", this could affect journalists' integrity and objectivity as he explained, as it shows them a small part of reality not the big picture. He suggested that this could be resolved through applying critical thinking to the content presented to the audience by AI.

Conversely, Gamal Ghitas, former Editor in Chief of Loghat Al Asr Magazine, believes that the ethical concerns related to AI are more related to amateurs using this technology not to professional organizations because organizations have three things: professional values that regulate personal actions, professional skills that require specific standards like accuracy and verification, and tools used to show the best professional skills while maintaining the needed professional values. He explained that organizations would produce deep fakes because this contradicts with their professional values. They would also verify the information they publish as it is a professional standard, so they would not use inaccurate information produced by ChatGPT.

As for regulating the ethical use of AI, El Mishtawy said that although academics say there needs to be specific laws to regulate artificial intelligence, he thinks that it is all about journalists' personal ethics and values because every country has its own systems, so it is up to every person to be aware of ethical and unethical practices. Similarly, Maha Salaheldin said that AI could not be regulated because it is an open-source technology and available to anyone. She said, "it all goes back to each person's conscience". In contrast, Hegazy stated that people differ in their ethical values so it could not be left for each person's self-regulation. It could not be left to institutional codes of ethics either because they are not actually applied according to Hegazy. Nevertheless, he said that organizations are responsible for what they publish, and they need to revise any AI generated content before posting it to their platforms, which is an opinion shared by Odai Ibrahim. Despite that, Ibrahim stated that putting specific regulations for AI is difficult from his point of view, and that the current laws that regulate journalism are enough because journalists and organizations are responsible for what they publish, which was also shared by Ashraf Gehad. Furthermore, users already hold organizations accountable when they post inaccurate information and call them out on social media, hence organizations are always vigilant when publishing news, as Ibrahim explained. Moreover, Gehad suggested that the syndicate could put some regulations and penalties that help control this new technology along with the existing laws.

As for El Senousy, she thinks that new regulations should be put in place, but they will be developed in the future according to emerging needs along with the new technologies, and that developing them will take time, which is a notion shared by Dr. Samar Aly. Similarly, Hegazy said "It is very important to put some laws that regulate the use of artificial intelligence because it has consequences on many parts of our lives", which makes it essential to clarify the boundaries of civil and criminal liability when it comes to using artificial intelligence. On another hand, Kamal and Gehad think that official laws and regulations could be used to censor journalists. Kamal added that they would not be effective in dealing with the ethical concerns of using artificial intelligence. He said that the best way to deal with technology is through technology, that other AI programs that discover deep fakes and AI generated content would be more effective to protect people from harmful content more than regulations. As for Fawzy, he stated that he does not know whether artificial intelligence would need new regulations or not and that is something to be revisited in the future if the need arises.

On another hand, Ghitas believes that AI could not be regulated as no one has fully understood the mechanisms of ChatGPT, for example to be able to regulate it. He added "Countries with more advanced AI applications have not been able to regulate the use of AI yet". In contrast, Alexandre Sayad said "It is not easy for public policy to define what AI is, and what it is not, because when computer and digital communication start to blend with machine learning there is a kind of blur area". Furthermore, he stated that policies regarding sensitive and personal data are not ready to protect people, especially children and youth that give data throughout their daily use of the internet without awareness. Hence, Governments need to regulate AI now according to Sayad, or else it could be too late. Additionally, he stated that these policies need to address the creation of AI tools and applications, and data privacy issues which should state that some private and sensitive data must be preserved. However, to do all this the government cannot work alone, it needs to cooperate with civil society because if it is a top-down regulation it would not work according to Sayad. Moreover, he said that AI literacy needs to be part of schools, universities, and educational institutions' curricula to face all these

ethical concerns.

Although there are different ethical concerns pointed out by Dr. Mohamed Hegazy and other interviewees, he said that this does not mean we should not use this technology. He encouraged the use of AI applications as they could have lots of benefits, he said "AI is a double-edged weapon", and it could be used for good just as well as bad. Some of the benefits he pointed out is the collection of anonymized big data that could help in understanding more about the society and its health, for example, like the main diseases people suffer from, rather than invading users' privacy and gathering information about their habits that they did not consent to be gathered or consented without understanding the implications of what they approved of. Sayad also pointed out the consent issue as he stated that users do not understand what data is and they do not actually read the terms and conditions of the applications they are using, so it could not be considered that they approved of sharing this data.

A different point of view was offered by Al-Arqoub who said that he does not have any ethical concerns related to the use of AI at least in these early phases of adoption, however he said, "when we catch up to the West, we will share the ethical dilemmas they have", or the Middle East could have its own ethical concerns as he said. Al-Arqoub suggested that the debate around the ethical concerns in the region should be delayed until AI applications are more mature as this debate is creating a barrier against the use of AI instead of seizing the opportunity to be one of the leading regions in this industry. Conversely, Sayad stressed that it needs to be done now, he also explained that he thinks these ethical concerns are not limited to the west only as they are global issues because they are human rights and that is something universal. Nevertheless, he said that local cultures should still be protected so they would be able to survive the age of algorithms.

6.   DISCUSSION

The previous findings give several indications regarding the answers to the research questions. Table 1 summarizes the key findings, that are presented in detail in the discussion section:

Table 1. Research Questions Key Findings

Research Question	Key Findings
RQ1: AI Awareness	- Notable lack of comprehensive understanding of AI potential applications. - Generational differences in AI awareness, with younger journalists exhibiting more favorable attitudes. - Limited AI literacy and awareness among managers, hindering AI adoption.
RQ2: Upskilling	- Lack of AI upskilling opportunities for journalists. - Deficiency in exposure to AI-related training material. - Readiness of journalists to engage in upskilling impacted by motivation and time constraints.
RQ3: Ethical Concerns	- Emphasis on ethical use of AI applications, including fact-checking, understanding data origins, and human supervision. - Diverse ethical concerns raised, such as accuracy, copyrights, bias, and privacy invasion. - Mixed opinions on the prematurity of ethical discussions, with some viewing it as an excuse to avoid learning and applying AI technologies. - Recommendations include human supervision, addressing copyright concerns, and mitigating privacy invasion through categorizing sensitive data.

Regarding managers' and journalists' AI awareness, which is the first research question, the findings reveal a notable lack of comprehensive understanding concerning the potential applications of artificial intelligence (AI) within news organizations. While some news organizations reported moderate AI awareness among journalists, there was significant variation in perceptions among interviewees. Some participants indicated that journalists viewed AI as a potential threat to their professional roles, while others recognized its benefits. Past research has consistently highlighted the deficiency in AI awareness within organizations and its detrimental impact on technology integration (Mousa and Abdulfatah 2020; Hamm and Klesel 2021), possibly stemming from journalists' reluctance to embrace AI (Attia 2019). Interestingly, generational differences were evident, with younger journalists exhibiting more favorable attitudes and greater awareness of AI's advantages, a trend consistent with previous studies indicating higher acceptance levels among journalism students compared to their experienced counterparts (Abdel-Hameed 2020; Goni and Tabassum 2020).

Overall, the responses from interviewees underscore the limited AI literacy and awareness prevalent among managers and journalists within Egyptian newsrooms. Participants commonly indicated that upper management in many Egyptian news organizations fails to promote AI adoption due to their lack of comprehension regarding the technology's underlying concepts, potential, and applications within the journalistic domain, which shows their lack of AI literacy and knowledge according to its definition (Long and Magerko 2020; Deuze and Beckett 2022).

Among journalists, organizations with broader AI integration exhibited relatively higher levels of AI literacy and awareness. Notably, interviewees from these organizations clarified that even within these contexts, AI literacy extended to only a fraction of employees, typically around 50%, except for cases such as Cairo 24, where comprehensive AI literacy was noted among all journalists due to the organization's early adoption of AI. However, across the broader spectrum, the interviews highlighted insufficient AI literacy among most journalists, often resulting from negative perceptions of AI, time constraints, and a lack of motivation to acquire AI-related skills.

Furthermore, the interviews revealed diverse perceptions among interviewees themselves regarding the definition of artificial intelligence. The literature on artificial intelligence acknowledges its vague nature, making it challenging to establish a clear definition that incorporates complex algorithms and theories (Zhai, et al. 2020). Various definitions were provided, some describing AI as machines acting like humans (McCarthy et al. 2006; Fjelland 2020), while others emphasized its ability to learn from data and apply reasoning and learning to achieve specific goals (Shekhar 2019).

These findings collectively highlight a significant deficiency in AI awareness, especially in organizations yet to explore AI adoption, as agreed upon by the experts and journalists interviewed in this study.

As for managers' and journalists' perceptions towards upskilling, the preceding lack of awareness regarding the potential applications of AI is paralleled by an absence of corresponding upskilling and training opportunities for journalists. The deficiency in exposure to AI-related training material became apparent in most participants' responses, indicating a potential gap in the knowledge and skills necessary for effective AI utilization. However, organizations participating in the study offered a different

perspective, highlighting their active involvement in training journalists in AI usage or expressing intentions to do so in the future. Conversely, an opposing viewpoint emerged, suggesting that not all journalists require direct involvement in AI-related tasks, as these tools demand minimal human input that could be managed by a select few individuals. Consequently, this perspective contends that not all journalists need comprehensive training in AI. Nevertheless, there was consensus among interviewees that continuous learning is essential to bridge skill gaps and adapt to the evolving job market. The absence of concerted upskilling efforts poses a potential barrier to the successful integration of AI, given its recognized importance as a prerequisite for effective AI adoption. This viewpoint aligns with Attia's (2019) assertion that education and training programs focusing on AI usage are indispensable for journalists. Additionally, Abdel Hameed (2020) emphasizes the crucial role of research institutions in enhancing knowledge within this domain.

A notable observation pertains to journalists' readiness to engage in upskilling and collaborate effectively with AI technology. It becomes apparent that many journalists either lack the motivation or the time required to invest in acquiring the competencies essential for working with this technology. This observation underscores the significance of addressing the motivational and practical challenges hindering journalists from fully participating in the upskilling process. Consequently, efforts geared towards promoting successful AI integration should not merely focus on the availability of training opportunities; they must also consider the underlying factors influencing journalists' attitudes and motivations regarding upskilling.

These observations underscore the imperative for robust upskilling and training initiatives within organizations, aiming to cultivate a proficient workforce capable of harnessing AI technologies effectively, as highlighted by Attia (2019). Such initiatives should not only encompass the provision of training materials but also address the motivational barriers, ensuring journalists' active engagement in the upskilling process.

Regarding the third research question related to the ethical concerns about AI integration in Egyptian newsrooms, multiple interviewees emphasized that AI ethics is a critical aspect within the realm of AI knowledge. Various concerns were raised, encompassing accuracy, copyrights, and the potential narrowing of perspectives, aligning with previous studies (Goldfarb and Tucker 2012; Ali and Hassoun 2019; Whittlestone et al. 2019; Jobin, Ienca and Vayena 2019).

Ethical concerns arising from AI integration in journalism were met with mixed responses. Some participants suggested it was premature to delve into these issues, arguing that discussions about ethics were sometimes used as an excuse to avoid learning and applying AI technologies. Nevertheless, the majority voiced concerns, touching upon matters such as copyright infringement, invasion of privacy through data collection, inaccuracy leading to misinformation, bias in news phrasing, lack of creativity, and the accountability dilemma regarding algorithms' outcomes. Many of these apprehensions echoed those articulated in prior studies. Concerns about creativity scarcity and overreliance on coverage templates were previously raised by Abdel Hameed (2020), while Ali & Hassoun (2019) emphasized issues like absence of monitoring, bias, transparency, fairness, and data utilization. Farag (2022) highlighted data utilization and invasion of privacy, suggesting potential resolution through cybercrime laws. The consent debate, revolving around users' understanding of data sharing online and the temporal scope of consent, resonated in the interviews and was reinforced by Dr. Mohamed Hegazy, who noted individuals' lack of comprehension regarding online terms. Alexandre Sayad added that users often don't realize that their online activities generate data about them, extending beyond what they intentionally publish on social media. Bias concerns were also raised, affecting both journalism and society, aligning with Jobin, Ienca & Vayena's (2019) findings.

Another concern highlighted was related to employment. The integration of automated technologies raised fears of reduced job opportunities. However, all interviewees argued that AI could not replace humans but would instead reshape job roles, focusing on more intricate and analytical tasks rather than routine activities.

These discussions led to several recommendations. According to interviewees, practices such as fact-checking AI-generated content, understanding the origins of data and creators, and incorporating human supervision could contribute to preventing biases and misinformation.

Interviewees also stressed the importance of human supervision to mitigate biases and inaccuracies in AI-generated content, enhancing accountability by holding organizations responsible for their AI applications. Regarding copyright concerns, it was suggested that identifying the data source could help attribute content to its originators and compare it with AI-generated materials. Addressing privacy invasion, participants proposed categorizing certain data as sensitive and private, preventing companies from

collecting and utilizing such information. Concerns about creativity deficiency and narrow perspectives could be mitigated through promoting critical thinking, encouraging its cultivation in educational institutions.

The need for regulations addressing ethical AI use sparked debate, with opinions varying from personal ethics to specific legislation, including proposals for integrating AI literacy into educational curricula.

While some interviewees argued that AI could not be effectively regulated, various public and private organizations have initiated efforts to establish principles and ethical codes governing AI use. Entities like the Asilomar AI principles, Partnership on AI, Lords Select Committee on Artificial Intelligence, IEEE Standards Association, Google, and SAP have contributed to shaping guidelines, emphasizing the importance of such regulatory frameworks in limiting the negative impacts of AI technology (Jobin, Ienca and Vayena 2019; Whittlestone et al. 2019).

7.   CONCLUSION

In examining the experts' perception of AI knowledge in Egyptian newsrooms, it becomes evident that while there is a prevailing deficiency in comprehensive understanding regarding AI's potential applications, there is a willingness among some organizations to engage in upskilling and training efforts to bridge this knowledge gap. The investigation into the extent of AI awareness among managers and journalists within news organizations highlights the variation in perceptions, with some acknowledging AI's benefits and others perceiving it as a potential threat to their professional roles. This diversity of opinions could be attributed to factors such as generational differences and prior exposure to AI technologies.

Furthermore, the interviews underscore the multifaceted challenges surrounding the definition of AI. The broader literature indicates that the ambiguity surrounding AI's definition reflects its complexity and evolution over time. This complexity is mirrored in interviewees' divergent interpretations of what constitutes AI.

Additionally, the investigation into attitudes towards upskilling among managers and journalists in Egyptian newsrooms underscores the critical role of lifelong learning in addressing skill gaps and ensuring the successful integration of AI. While some organizations demonstrate proactive efforts to train journalists in AI usage, challenges persist in motivating journalists to actively engage in the upskilling process. This

highlights the importance of addressing motivational and practical barriers to enhance the efficacy of upskilling initiatives.

Considering the potential ethical concerns of AI integration, it is evident that while interviewees voice various ethical apprehensions, they also recognize the technology's potential benefits. The ethical dilemmas raised, including accuracy, copyrights, bias, privacy invasion, and the potential reduction of human creativity, mirror concerns raised in prior research. The call for regulations and ethical guidelines is reiterated by interviewees, aligning with existing initiatives globally to establish ethical standards for AI.

In conclusion, the experts' perceptions illuminate a complex landscape wherein AI awareness, upskilling, and ethical considerations intersect. The study highlights the urgency of addressing AI literacy and training to ensure the effective integration of AI in Egyptian newsrooms while concurrently grappling with the ethical implications inherent to this transformative technology. As AI continues to evolve, the study's findings contribute to a deeper understanding of how to prepare news organizations for the ongoing technological shifts in the field of journalism.

8.   LIMITATIONS AND FUTURE RESEARCH

In light of the conclusions drawn from this study, several areas for future research present themselves. Longitudinal studies could provide insights into the changing dynamics of AI awareness, upskilling efforts, and ethical considerations over time in Egyptian newsrooms. Cross-cultural comparative studies would shed light on how cultural factors influence AI adoption and ethical concerns across different contexts. Investigating journalists' attitudes and motivations towards upskilling in AI, along with the development of comprehensive ethics frameworks for AI integration in journalism, could offer strategies for enhancing both AI literacy and ethical decision-making. Furthermore, assessing the effectiveness of upskilling initiatives, exploring the impact of AI regulations, and examining how AI affects audience perception and editorial decision-making stand as potential directions for future research. Lastly, delving into the role of AI in various journalism domains beyond newsrooms and considering the influence of media literacy education on AI understanding could contribute to a more comprehensive understanding of the AI-journalism relationship.

However, this study has certain limitations. The

research is limited by the relatively small sample size of organizations, potentially affecting the representativeness of findings across the broader landscape of Egyptian newsrooms. Moreover, this study focuses primarily on qualitative data from expert interviews, which might not capture the full spectrum of AI awareness and practices within the entirety of the news industry. Additionally, the study relies on self-reported perceptions of experts and professionals and might be subject to response bias. Finally, this study tackled only one category of five categories that indicate artificial intelligence readiness in newsrooms, thus it does not show how it could influence other categories or could be influenced by them.

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