The Evolution of Mass Media: the Significance and Influence of Automated Journalism in the Era of Artificial Intelligence

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Abstract. The objective of this study is to investigate the evolution of mass media during the era of artificial intelligence (AI) and analyse the significance and consequences of automated (robot) journalism. Additionally, the study seeks to identify the advantages and obstacles associated with the integration of robot journalism within the media sector. The present study utilises a qualitative descriptive methodology. The data gathering methodologies employed in this study encompass a comprehensive literature review and in-depth interviews. The literature sources employed in this study encompass a range of scientific journals, papers, books, and relevant research reports, supplemented with interviews. The findings of this study suggest that the implementation of automated (robot) journalism within the media industry enhances operational effectiveness in news production, enabling the creation of a greater volume of content within a shorter timeframe. Robots continuously monitor news sources, allowing them to create and provide content to readers in a timely manner, which permits the effective distribution of news in real-time. Robot journalism increases the accuracy of data collection and analysis, making it easier to produce news pieces that are based on reliable data, thus increasing their reliability. However, the integration of robot journalism may have implications for employment dynamics, potentially resulting in a decrease in the workforce engaged in the news production process.

Keywords: Automated Journalism, Robot, Artificial Intelligence, Mass Media.

1   Introduction

Mass media is a tool used by humans to convey messages. Mass media is important because it possesses power, not just in delivering messages to the audience, but more so because it serves the functions of educating, influencing, informing, and entertaining [1]. According to Law No. 40/1999, the function of the press is stated as follows: the national press has functions as an information medium, education, entertainment, and a social control medium. Social control can take the form of public participation in governance and government accountability to the people [2]. Mass media plays a very

important role in the life of society, primarily because a consumption-oriented society relies on information that can support their livelihood.

In the era of artificial intelligence (AI) technological advancements, mass media has undergone significant changes. The emergence of robot journalism is one of the important phenomena that has arisen because of advances in the field of AI [3]. Robot journalism has great potential to revolutionize the news production process by harnessing rapid computational and data analysis capabilities. In this regard, robots can produce and deliver news more efficiently and quickly compared to conventional methods that involve humans [4][5].

However, with the advent of robot journalism, a few serious concerns have also arisen that need to be considered. One of them is ethical considerations related to the use of this technology in news production. Issues such as authenticity, integrity and accuracy of the news can be major concerns when the news production process is carried out by robots. Diakopoulos [6] contends for algorithmic accountability, emphasizing the need for journalistic investigation of computational power structures to maintain authenticity in robot-generated news. To effectively tackle this issue, it is imperative to priorities the establishment of transparency and accountability in the algorithms employed by the robots. Domingo et al. [7] highlights the significance of including interactive journalism practices to protect the integrity of news production. The inclusion of human journalists in the process allows for more effective addressing of ethical problems. It's critical to have effective fact-checking procedures in place to guarantee accuracy. Franklin [8] focus attention on the need for journalists to confirm information and cross-reference various sources. Additionally, quality control is also a concern because it is essential to ensure that news generated by robots still meets high journalistic standards. According to Singer [9], the presence of user-generated visibility contributes to the process of quality control, as users assume the position of secondary gatekeepers within a shared media environment. Users can make valuable contributions to the enhancement of robot-generated news by actively participating in news consumption and offering constructive criticism.

Furthermore, the potential for bias in automated news generation by robot journalism also needs to be considered. Dependence on algorithms and data used by robots can lead to news that tends to reinforce existing biases, whether they are political, social, or even gender biases. Biases can develop in automated news creation by robot journalism when Clerwall [10] insights are considered. These biases may be associated with gender, political ideologies, or cultural norms. To mitigate such biases, it is imperative to establish and enforce robust supervision and review systems. This includes the implementation of measures to promote transparency in the algorithms employed, the supervision of news subject and source selection, and the proactive mitigation of biases in the design and interaction of news-producing robots. Therefore, there is a need for effective oversight and evaluation mechanisms to control this potential bias.

This article aims to delve deeply into the transformation of mass media in the context of the role and impact of robot journalism in the era of artificial intelligence (AI). By exploring relevant literature, case studies, and interviews with experts, this research will identify the benefits and challenges associated with the integration of robot journalism in the media industry. Additionally, it will also discuss the social implications

of the adoption of robot journalism, including changes in employment dynamics in the media industry and changes in news consumption patterns by the public. Through this article, it is hoped that a better understanding of the transformation of mass media in the era of artificial intelligence (AI) and the role and impact of robot journalism can be gained. The results of this writing can contribute to the development and implementation of more ethical and improved robot journalism in the media industry.

2   Method

This research employs a qualitative descriptive methodology, and the data collection techniques used in this study are literature review and interview. Here is a more detailed explanation of each data collection technique [11]. This method involves searching for and reviewing relevant literature on the topics of robot journalism, mass media transformation, and the development of artificial intelligence (AI) technology. Literature sources used include scholarly journals, articles, books, and related research reports. Literature analysis is conducted to gain an in-depth understanding of the research topic, identify relevant theoretical frameworks, and gather up-to-date information on the benefits and challenges of integrating robot journalism into the media industry. This research aims to provide a comprehensive understanding of the benefits and challenges of integrating robot journalism into the media industry and its implications for mass media transformation.

3   Result & Discussion

The utilization of computers and robotics in the field of journalism has experienced notable advancements throughout its evolution. The initial emphasis was placed on the automation of operations involved in news production. In their work, Huang [12] examines the utilization of manuscript writing robots within the domain of news dissemination. This technological advancement has brought about a significant shift in the role of journalists, transitioning them from just information gatherers to those engaged in more creative endeavors. This observation suggests a trend towards the adoption of robotic systems in the execution of jobs that have historically been carried out by journalists.

The emergence of the concept of "robot journalism" pertains to the automation of news production. Clerwall [10] discusses the nomenclature associated with these phenomena, including phrases such as "robot journalism," "automated content," and "algorithmic news." These terms underscore the growing prevalence of algorithms and automated systems in the production of news material. The development of automated journalism (robot journalism) in Indonesia was first developed by Beritagar.id. According to study of Amran [3] in Robot Journalism in Online Media: Beritagar.id, Beritagar employs artificial intelligence (AI) as a means of facilitating news production, notably through the utilization of robot journalism. The implementation of robot journalism in Beritagar.id is exemplified through its utilization of Robotorial, a specialized platform dedicated to reporting on the outcomes of football matches. The objective of using robot

journalism in Beritagar.id is to enhance news production efficiency and augment the volume of information. This technology enables the creation of news content in several languages while minimizing the occurrence of errors and biases. Robot journalism in Beritagar.id is largely utilized for writing news articles connected to sports match results, while human journalists focus on writing other types of news stories and features. The integration of robot journalism inside Beritagar.id is perceived as a promising avenue for augmenting the caliber of journalism, since it enables human journalists to focus their efforts on comprehensive reporting and investigative endeavors. Subsequently, Beritagar underwent a name change and adopted the new appellation of "lokadata." However, there is ongoing research and development aimed at enhancing the efficacy of artificial intelligence in the generation of various news articles. At present, numerous online media in Indonesia have begun implementing automated journalism in the coverage of various topics, including weather and earthquake reports.

Benefits of robot journalism in the media industry will increase efficiency in news production through the utilization of robot journalism, the media industry can experience increased efficiency in the news production process [13]. With rapid computational and data analysis capabilities, robots can perform news production tasks more efficiently compared to conventional methods involving manual work by humans. Robots can gather data from various sources, conduct analysis, and generate news articles automatically. This reduces the time and effort required in news production, allowing mass media to produce more content more quickly. Faster and real-time news delivery robot journalism also offers benefits in delivering news faster and in real-time. Hermida et al. [14] discovered that social media users actively share, like, and recommend news stories. This participation facilitates rapid news dissemination, resulting in quicker news delivery. With the ability to continuously monitor news sources and identify important events, robots can promptly generate and deliver news to readers within a short period. In an era of fast information and demand for the latest news, the ability of robots to provide real-time news keeps mass media relevant and competitive with its counterparts.

Enhanced accuracy in data collection and analysis robot journalism brings improvements in data collection and analysis accuracy. Robots can rapidly and accurately collect data from various sources. Moreover, they can analyze data objectively, identifying patterns and trends that might be overlooked by humans. Lewis et al. [15] highlights the hybrid approach of integrating computational and manual methods in content analysis to extract real-time insights from massive amounts of data. This allows news organizations to provide their audience with timely and relevant news. With the analytical capabilities mastered by robot journalism, mass media can produce more accurate news based on strong data. This increased accuracy helps reduce the risk of errors and ensures that the information presented to readers is more reliable. Diversification of news formats and presentations robot journalism enables the diversification of news formats and presentations. Robots do not only produce text news articles but are also capable of creating various other formats such as video news, infographics, or podcasts. This diversification provides a richer news experience that aligns with the preferences and needs of readers. Mass media can reach audiences in more diverse ways, enhancing the

appeal of news content and meeting the increasingly varied expectations of users in the digital age.

Some of the Challenges in integrating robot journalism is ensuring good quality control over the content produced [13]. While robots can produce news quickly, their abilities to recognize context, factual errors, or subjective judgments are still limited. Therefore, it is essential to have robust oversight and assessment mechanisms to ensure that news produced by robot journalism meets the standards of good journalism quality. Bias considerations in the use of robot journalism also raises concerns about the potential for bias in automated news generation. Dependence on algorithms and data used by robots can lead to news that tends to reinforce existing biases, whether they are political, social, or even gender biases. Therefore, it is important to develop mechanisms that address and reduce the potential bias in the algorithms and data used by robot journalism. Accountability and ethics in the use of journalism robots present challenges in terms of accountability and ethics [16]. Who is responsible for the accuracy of information conveyed by robots? How to address situations when errors or ethical violations occur in the generated news? Clarity in the allocation of responsibilities between humans and robots and the application of relevant ethical principles in journalism are required. Changes in employment and the integration of robot journalism in the media industry also impacts employment dynamics. With robots capable of performing news production tasks, there may be a reduction in the number of human workers involved in the process. This has the potential to affect the job market and needs to be considered in managing transitions and training for affected workers.

Changes in news consumption patterns in the implementation of journalism robots also bring changes in news consumption patterns among the public. It was found by Mitchell et al. [17] that a big part of the public now gets their news from digital sources. Many people want faster and more up-to-date news because of this change in how they consume information. To meet this need, news organizations, even those that use robot journalism, have created news material that is always being changed and sent out in real time. With the ability to deliver news more quickly and diversify news formats, people can access information differently. These changes can influence reading habits, content consumption preferences, and interactions with mass media.

Social Implications of robot Journalism will change employment dynamics. The integration of robot journalism in the media industry has significant social implications related to employment dynamics. With the adoption of robot journalism technology, jobs previously performed by humans in news production may be replaced by robots. This potential has repercussions that require serious attention in terms of transition management, workforce relocation, and training to mitigate negative impacts on human workers. Changes in information consumption and access robot journalism brings significant changes in the patterns of information consumption and access by the public. With robots capable of rapidly and automatically producing and delivering news, people can access information more easily and in real-time. This affects shifts in news consumption preferences, the speed of information consumption, and interactions with mass media. Social implications include changes in reading habits, trust in information sources, and social interaction patterns related to news.

Unrestricted news delivery beyond time and space limitations robot journalism enables the delivery of news unrestricted by time and space limitations. With AI technology, robots can automatically gather, process, and deliver news in real-time without geographical constraints. This allows people to access news quickly and accurately, regardless of their location. The social implication is increased information accessibility and a broader understanding of events and issues occurring in various regions. Potential bias and limited reasoning when using journalism robots also has social implications related to potential bias and limited reasoning in making news. Robots rely on algorithms and data used to produce news, which can lead to the amplification of existing biases. Additionally, robots' abilities to understand complex contexts, make subjective judgments, and interpret nuances remain limited. The implication is the risk of errors, information imbalance, and the lack of a comprehensive perspective in news generated by robot journalism.

Any recommendations for the development and implementation of robot Journalism. Development of transparent and open algorithms to address concerns about bias and limited reasoning in news generation by robot journalism, it is essential to develop transparent and open algorithms. The active pursuit of identifying flaws and biases in algorithms and models is a crucial task for algorithm developers [18]. The comprehension of prejudice and transparency is significantly enhanced by the inclusion of the notion of diversity. According to Giunchiglia [19], the inclusion of diversity views has the potential to enhance algorithmic transparency and justice. Algorithms that are accessible and understandable to the public will help reduce distrust and enable monitoring of potential biases. Moreover, the use of ethical AI principles and strict supervision of algorithm usage should also be considered.

The mitigation of algorithmic bias necessitates the adoption of a multidisciplinary framework that encompasses the collaboration of scholars, practitioners, policy makers, and citizens. The cooperation among these several entities is of utmost importance in the joint development and assessment of algorithmic decision-making procedures that aim to optimize justice, accountability, and openness, all while upholding the principles of privacy [20]. Enhanced quality control to maintain high journalism standards, there is a need for improved quality control over news generated by robot journalism. Effective oversight and assessment mechanisms should be implemented to ensure that robot-generated news meets criteria for accuracy, integrity, and relevance. Involving human editors and journalism experts in the evaluation process can help identify and rectify potential errors or biases. Establishment of ethics guidelines for robot journalism in addressing ethical considerations arising from the adoption of robot journalism, specific ethics guidelines should be developed for the use of this technology in news production. These guidelines should align with principles of truthfulness, integrity, and social responsibility. This includes transparency regarding the use of robot journalism, disclosure of technology usage to readers, and protection of privacy in data collection and processing. These include the violation of consumer data privacy and security, intensive profiling, lack of transparency, and consumer autonomy and decision choices [21].

Training and human capability development while robot journalism can enhance efficiency and faster in news production, the role of humans in managing and monitoring the process remains essential. The comprehension of the many aspects that have an

impact on trust is vital in the development of efficacious training programs and the establishment of a constructive working rapport between human beings and robots [22] Therefore, efforts are needed to train and develop human capabilities in handling robot journalism technology. Training should encompass understanding AI technology, skills in managing algorithms, and critical abilities in evaluating news generated by robots. Cherubini et al. [23] provide a reference that offers valuable insights into the potential of training to improve the capacities of people and robots within the industrial industry. Stakeholder collaboration and dialogue in the development and implementation of journalism robots is very important [24]. This includes regulators, the media industry, AI experts, journalists, and the wider public. Close collaboration enables the exchange of knowledge, ideas, and experiences to address challenges and promote sustainable and ethical development of robot journalism.

4   Conclusion

In this written work, we have discussed the transformation of mass media and the roles and impacts of robot journalism in the era of artificial intelligence (AI). Through literature analysis, various aspects related to the integration of robot journalism into the media industry have been explored in depth. The inception of automated journalism or robot journalism can be traced back to its initial implementation in sports news. With the advancement of artificial intelligence, an increasing number of online media platforms in Indonesia have begun adopting automated journalism techniques to report on a wide range of subjects, encompassing weather conditions and seismic activities.

Robot journalism has significant potential to revolutionize the news production process. The speed, efficiency, and accuracy achieved through robot journalism can enhance the overall performance of the media industry. However, the adoption of robot journalism also faces several challenges. Ethical issues, quality control, and the potential for bias in automated news generation must be addressed seriously to ensure that robot journalism maintains standards of truthfulness and integrity. The social implications of adopting robot journalism also need to be considered. Changes in employment dynamics in the media industry and shifts in news consumption patterns among the public require thoughtful consideration in managing the social impacts of robot journalism.

To develop and implement more ethical and improved robot journalism, there is a need for the development of transparent and open algorithms, enhanced quality control, the establishment of specific ethics guidelines, training, and human capability development, as well as collaboration and dialogue among stakeholders. To optimize the benefits of robot journalism and address the challenges at hand, close cooperation among regulators, the media industry, AI experts, journalists, and the public is essential. Thus, the implementation of robot journalism can contribute positively to the transformation of mass media in the era of artificial intelligence (AI).

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