Reconstruction of news production driven by artificial intelligence in China

*Yang Xi
Taylor's University, Malaysia
xi.yang@sd.taylors.edu.my

Roslina Abdul Latif
Taylor's University, Malaysia

ABSTRACT

With the advent of the Fourth Industrial Revolution, artificial intelligence (AI) has been rapidly penetrating various fields and industries. Similarly, the news and communication industry which depends on media to a certain extent continues to undergo transformations as a result of AI in the Industrial Revolution. With the evolution and advancements of technology, AI is reconstructing the news production process. This study conducted in-depth interviews with the Director of Content Operation in Toutiao, the Product Operation Manager of the AI data platform in Toutiao, the Deputy Editor-in-Chief of Xinhua News Agency (Shanxi Branch) and the Executive Deputy Director of the Media Convergence Development Center of the Editorial Office of Xinhua News Agency (Shanxi Branch) as they are directly involved in the use of AI and the transformation of these two newsrooms. A qualitative analysis was also conducted based on relevant Chinese and foreign literature to clarify the transformation of Chinese traditional news media and its application in the field of AI. This study argues that AI has promoted the transformation of traditional Chinese news media and continues to redefine the production links of news planning, information gathering, information processing, news auditing and news distribution. The arrival of AI technology has broken the person-to-person path of news source transmission and established a new way of gathering and editing news. The relationship between receivers is more interchangeable, and news productivity has become faster. But at the same time, negative effects such as information leakage, "information cocoon", "scream effect", monotonous mode as well as contradiction between tool and news value should also be addressed. This paper puts forward insights on the model and transformation of news production in Chinese traditional media, the impact of AI on Chinese news production, and countermeasures regarding the problems brought by AI to news production to provide some valuable thinking and suggestions for Chinese news media with regard to the AI revolution.

Keywords: **News production, artificial intelligence, big data, algorithm**

INTRODUCTION

How AI technology promotes reform in the news business

In the traditional news industry, there are specialised personnel in charge and a strict production process in place between various links such as information collection, editing, production, dissemination, and circulation. There is a linear news production mode between each link in the news process, in a timely order. In a newspaper, for example, the production of a news item first requires the reporter to collect, sort out, investigate, and plan clues in the early stage. After data collected is verified and deemed newsworthy, it is written into a story and sent to the editorial department for multiple checks and typesetting, and finally, delivered to be printed for news distribution (Abdul Latif & Oh, 2020). The traditional television news production process also follows the same process, albeit with visuals.

Today, AI has changed the conventional news production model in terms of information collection as big data technology, sensors, and unmanned aerial vehicles are used for information and data collection. In the news editing and production stage, robot news writing is applied, through a computer program, whereby the collected and inputted data or information is automatically analysed, and processed to generate a relatively complete news report, which not only improves the speed and quantity of news production, but also reduces cost.

In news presentation, intelligent editing uses Virtual Reality (VR) and Augmented Reality (AR) technologies that provide users with immersive live news experience and enables them to have a deeper understanding of the news scene. Another factor that has contributed to public engagement in digital journalism since at least 2020 are the new approaches used in digital news storytelling. Digital news storytelling increasingly features unique qualities that can engage users. These include interactivity, multi-sensory content, mobile access, and immersion (Pavlik, 2021). In news distribution, the recommendation engine based on data mining measures accurate social information. Users go through the algorithm, according to real-time information on needs, news output, information feedback, user data, to push multi-dimensional personalised content to different users to ensure stickiness.

The application of AI in news production

With the changes brought by AI to the traditional news production mode and the promotion of national policies, China's exploration of AI in news production is getting more creative. Compared to other foreign countries, the application of AI in news production in China started late, but the development has been rapid. Among Internet companies and mainstream media, Toutiao and Xinhua News Agency are the leaders.

Toutiao is a news app developed by Beijing Bytedance Technology Co., Ltd., China, and created by Zhang Yiming in March 2012. According to QuestMobile, in November 2019, more than 260 million people were active on Toutiao, and the average person spent 83.52 minutes using it on a daily basis. Further, industry installation exclusive rate reached 17.48% (2020).

Toutiao is considered "a new generation of information and content platform driven by AI." Since its establishment, Toutiao's core technology has been intelligent algorithms. This "no real-person editor" content application uses engine technology for massive information collection, in-depth data mining and user behaviour analysis to intelligently recommend personalised content for users. In August 2016, the AI robot "Xiaomingbot" jointly developed by Toutiao Lab and Peking University, generated 450 articles in two

seconds for the Rio Olympic Games, where a single article was viewed and read more than 100,000 times, winning widespread response and praise.

Xinhua News Agency, China's national news agency, was founded in 1931, and is a legal news regulator, and one of the world's foremost modern news agencies. This news agency is an important propaganda and public opinion organisation established by the Communist Party of China in the early days. It has more than 100 branches all over the world, and in every province, municipality, and autonomous region in mainland China. Xinhua News Agency is also one of the major sources of news for the Chinese media, and publishes articles in English, French, Spanish, Russian, Arabic and Portuguese.

On November 7, 2015, Xinhua News Agency released its first news robot, Kuaibi Xiaoxin, which can independently complete data collection, process as well as compile and distribute manuscripts. In 2017, Xinhua News Agency developed China's first AI media platform, *Media Brain 1.0*. In the following year, *Media Brain 1.0* automatically produced the first MGC (machine-generated content) video news, summarising the high-frequency buzzwords. Xinhua also used intelligent algorithms, big data, voice image synthesis and other technologies to develop *MAGIC*, which is an upgraded version of *Media Brain 1.0*. It has a super intelligent system, which can automatically produce video, text, pictures, and other content. At the end of the same year, *Media Brain 3.0* was released. In 2019, it was used again with more depth, speed, beauty, and weight to realise intelligent video editing, packaging, and distribution.

Thus, the arrival of the AI era has led to a subversion and reconstruction of China's news and communication industry in all aspects. As such, both the traditional media and emerging media based on the Internet are seizing the boon brought by technology and seeking advancement for themselves.

OBJECTIVES OF THE STUDY

By analysing the impact of AI on news production and evaluating existing related practices, this research focuses on the following objectives:
(a) to analyse the traditional Chinese news media and its transformation through AI
(b) to explore the impact of AI on China's news production
(c) to identify countermeasures that can address the issues stemming from AI in news production in China

The impact of AI in news production has gained a strong traction in the academic community, but most of the current theoretical research are broad elaborations, lacking scientific research methods as well as systematic argumentation and analysis. The studies mainly focus on the operational technology and influence level of automated content production, but lack analysis combined with industry practices in the news media.

Therefore, this research is expected to enrich and expand the theoretical literature on the application of AI in news production through in-depth interviews with industry players to analyse the integrated development of AI and its impacts in news production.

It is also hoped that the analysis of these issues can provide a basis for understanding how AI will drive the reconstruction and logic, not only for China's news production in the future, but also for other countries. The detailed development, application and attendant problems are worth exploring.

LITERATURE REVIEW

Application of AI in news production

Information collection

Yu et al. (2017, p. 41) fully affirmed the prominent role of sensor in collecting information "Information collection is the first and most important step in news production. In the era of traditional media, information collection is completely dependent on manpower. In the era of smart media, sensor technology with sensors as carriers and big data processing technology as support plays an important role in enriching and optimising news sources."

Indeed, with the advent of AI, news information sources are no longer limited to text, pictures, audio, video and other conventional forms, while information collection can be done without human beings, solely dependent on machines. Sensors help us investigate things that cannot be seen, heard, or touched, and these tools provide us with new senses (Washeck, 2014). Further, the use of sensors not only expands the dimensions of information, but also makes the analysis of relevant data more rapid and accurate. In other words, sensors have optimised the traditional mode of information collection.

News content production

Yu (2015) believed that in terms of content production, "machine news writing" can achieve the following: accurate, quickly generated, and standardised news information. Through the intelligent learning of different corpus language styles, machines can automatically generate expressions adapted to the language customs of different people to achieve intelligent labelling, clustering, and matching for massive content production; build a global perspective and form structural analysis conclusions through the overall processing of big data and fragmented text.

Although robot writing has the advantages of producing fast, accurate and personalised news, most scholars believe that robots cannot replace human writing in the near future, and that human-computer symbiosis should be the optional direction. He and Zhang (2018) highlighted that while machine news writing has shown obvious advantages at present, it is still not able to complete offline interviews, and that instead, media professionals should be good at taking advantage of the machine to adapt to new development trends.

Similarly, Liu and Wei (2019) pointed out that the working principle of "robot news writing" demonstrate that it is more suitable for reports in data-intensive fields, is unable to complete in-depth reports, and lacks news sensitivity and "human interest". In addition, Ali and Hassoun (2019) contended that artificial intelligence in journalism raises professional and ethical issues; notably, the undermining of creativity, the absence of monitoring, as well as issues of bias, transparency, fairness, data utilisation, and data quality. They also opined that artificial intelligence technologies will enhance, rather than replace, journalists' work. Hence, artificial intelligence does not pose a threat to the journalism profession.

News scene presentation

In the aspect of news presentation, news technology not only changes the form of news text, but also the potential to reshape news narrative paradigms (Zhu, 2017). Peng (2017) believed that in the future, news production will be redefined not only at the producer's end, but also at the consumer's end. One important transformation is the change in news experience. Watson (2017) highlighted that with the support of VR and AR technology, the following effects can be achieved through the connection of content and

scene: "immersive journalism" realises scene reconstruction and creates an immersive sense of presence; the "first person" perspective enhances the user's "sense of involvement", constructing a knowledge map to realise new cognitive experiences.

Content distribution

Scholars believe that the core of AI is data mining. As such, the audience analysis of media will become more accurate, and the aggregation and distribution of content will become more precise, intelligent, objective, and personalised. Through big data mining technology and personal information behaviour tracking, news organisations can make intelligent recommendation for users and execute personalised news customisation (Liang & Zheng, 2016). Thurman et al. (2019) studied audience's views based on the mechanism of news selection and its reasons. Their results show that compared to past editorial planning, algorithmic news push guided by users' past consumption behaviour is a better way to obtain personalised news.

When algorithm-based push becomes the first c h oice f o r u s ers t o c u stomise personalised information, worries about the "echo chamber effect" and "information cocoon room" become endless. Some scholars believe that news production using algorithmic push makes information flow in a relatively closed circle, and what you see will always be what you want to see and be interested in. This can easily solidify the original cognition, enlarge the information deviation, and accelerate the differentiation of opinions (Xie, 2017).

THEORITICAL FRAMEWORK

The gatekeeper theory was first put forward by American social psychologist Kurt Lewin. He described the control of the family table meals as "while food may come from different sources, the process of putting the food on the table involves a series of decisions, for example, finding it, buying it and transporting it, which can be referred to as gatekeepers (master channels for individual or organisation)" (Lewin, 1943). Lewin further discussed the gatekeeper theory in Chantels of Group Life (1947). He believed that "information always flows along channels containing "gateways" where a decision is made, either by impartiality or by the personal opinion of the gatekeeper, as to whether information or goods are allowed to enter or continue to flow through the channel" (Lewin, 1947).

White (1950) formally introduced the theory of gatekeeper into the field of news communication. He proved the existence of "gatekeeper" in news communication through experiments and established the theory of gatekeeper in the mode of information screening. Since then, the theory of gatekeeper has continued to attract the attention of scholars. For example, Bass (1969) proposed that attention should be paid to the differences between different gatekeepers. He believed that the most important gatekeepers of news communication occur inside the media, and thus proposed the "double action mode". In this process, the gatekeeping activities of the media are divided into two stages, the first stage being news gathering with the main gatekeeper still being the reporter. In the second stage of news processing, the gatekeeper is the editors. The gatekeeping activities (editing) in the second stage are more decisive than the gatekeeping activities in the first stage (collecting and writing). Shoemaker (1991) argued in his study that checks could be carried out at five levels: social system, media system, media organisation, media work and individual. By analysing the importance of the different levels in information transmission, he provided a new way of thinking for the theory of gatekeeper.

METHODOLOGY

The issue of AI driving the restructuring of news production is relatively complex. Only through in-depth interviews with senior practitioners, can we understand the transformation of the existing news production and the difficulties in the application of AI in news production, and derive the most reasonable answer to the question of how to better integrate AI with news production as the insights provided by frontline practitioners are based on reality.

Purposive sampling was conducted to select the following interviewees for the study:

(a) Geng Chang — Director of Content Operation at Toutiao (Tianjin Branch) for five years. Responsible for formulating strategies for content production, quality, distribution, and creation guidance; coordinating product, data, and technology to promote the implementation of the platform, and managing daily operations.

(b) Zhang Yi — Product Operation Manager of the AI data platform at Toutiao (Tianjin Branch) for four years. Mainly responsible for data monitoring and analysis related to product operation, exploring the business behind the data, discovering potential defects and opportunities, and providing data support for business decisions.

(c) Yan Guozheng — Deputy Editor-in-Chief of Xinhua News Agency (Shanxi Branch). He has worked in Xinhua News Agency for 14 years, and is responsible for the arrangement and inspection of the overall Editorial Department of the Shanxi Branch.

(d) Yuan Xun — Executive Deputy Director of the Media Convergence Development Center of the Editorial Office of Xinhua News Agency's Shanxi Branch. He has worked in Xinhua News Agency for 10 years, and is responsible for integrating TV, radio, network, mobile phone and making use of big data, AI, cloud computing and other technologies to conduct unified news interviews, editing and release.

The versatility and reliability of data collection are two significant factors in deciding on the qualitative approach for research (Glesne, 2016). As such, qualitative research is suitable for this study as it aims to explore the perspectives of experts in the areas of AI and news production. All interviews were conducted via Zoom due to the COVID-19 pandemic at the time of study, with the duration of each interview lasting about 45–60 minutes.

DATA ANALYSIS AND DISCUSSION

Based on the analysis of the respondents' responses, three broad themes could be identified, namely, the transformation of news production in Chinese traditional media, the impact of AI on Chinese news production, and countermeasures regarding the issues caused by AI in news production.

Transformation of news production in China

Transformation of Chinese traditional news media as a result of AI

Chinese traditional news media have been transformed using sensors, unmanned aerial vehicles (UAVs), web crawlers, writing robots, artificial automatic identification, algorithmic recommendations, VR, AR, and big data technologies; specifically, they have changed the way the media collect news and information.

In the era of AI, with the rise of big data technology, sensor technology supported by big data processing plays an important role in enriching and optimising news sources. As such, any object equipped with sensors or data processors can become a collector of information (Webster, 2017).

The "2410" intelligent media production platform launched by Xinhua News Agency in 2017 can analyse data content from cameras and other sensors in real time as well as automatically identify specific scenarios and emergencies such as fires, explosions, and traffic accidents. They also provide panoramic news clues and materials round the clock as well as second-level responses, making the sensors truly the eyes of the media. It captures and generates breaking news and major events one step ahead of the others. Thus, web crawlers can help journalists retrieve information from the Internet in the shortest possible time.

> *"Sensors, UAVs, web crawlers, etc., these AI technologies not only make information collection more convenient and labour-saving, the spatial breadth and temporal dimension of news information collection has also been broadened, but also opens up the feedback channel of news production."*
>
> (Geng Chang, June 7, 2021)

Chatbots have also enriched news gathering:

> *"In addition to our first intelligent entity robot "Si", as a trainee reporter, I was involved in two series of interviews, to be able to use simple questions to respondents and the interview will also be directly converted from voice to text to save the reporter's "play time."*   (Yuan Xun, June 27, 2021)

Big data technology has also revolutionised the news process and presentation aspects of traditional Chinese media. With the rise of data journalism, more dynamic charts and animations based on big data are used in news production. The data is news that is mined, analysed, and presented in the form of data visualisation through relevant big data technologies on the massive data resources of news information (Peng, 2017). The range of technologies related generally to the field of cognitive computing is poised to exert transformative influence on journalism, media, and society around the world. These include algorithms, artificial intelligence, and data. Together, these technologies are driving far more than automation in news gathering and reporting. They are enabling the augmentation of human journalists and journalists to transform the nature and quality of journalism (Pavlik, 2016).

In data journalism, journalists are not only collectors of information, but also diggers of information. Thus, not only do journalists need basic writing and editing skills, they also need to have the ability to analyse data, judge the authenticity of data sources through data mining and data analysis, and apply them to news stories as key arguments to support stories.

> *"There is also news that is presented in the form of data visualization and other forms by mining and analysing the massive data resources of news information through relevant big data technologies, which is also known as data journalism. This kind of news will be more objective, which will not only attract the attention of the audience, but directly express information that the news report wants to spread."*   (Yuan Xun, June 27, 2021)

News editing and writing is the core component of the news production process. The emergence of intelligent robots has not only rewritten history but also innovated the way news is written. From Tencent's Dreamwriter to Xinhua News Agency's Kuaibixiaoxin and Toutiao's Xiaomingbot, China's major technology companies and news media units have successively applied AI technology to news production activities (Shi & Long, 2016).

"We have a news writing robot called 'Xiaomingbot', which collects data, inputs it into a database, analyses and processes this data based on the frequency of sentence occurrences and keywords of news elements, creates a set of templates that matches the style of the media, and then puts news elements into a news message that can be quickly generated." (Zhang Yi, June 12, 2021)

"Our Xinhua News Agency has a writing robot called 'Kuaibixiaoxin', which not only enriches the news content, but greatly improves the timeliness of the news, and the articles are more objective than those written by journalists, because they don't carry personal emotions. " (Yan Guozheng, June 18, 2021)

News content audit refers to the examination of the produced news by editors, chief editors, or editorial offices, including the timing of topic selection, political stance, sensitive and indecent words, conventional mistakes, etc. No matter how the news content is presented, it is inseparable from news censorship. AI has also revolutionised the proofreading and review of traditional Chinese media.

"AI automatic identification technology can review most of the content and identify sensitive videos, reducing the workload of manual secondary review. This technology was later applied to news production, such as broadcast business news review activities such as program auditing and news release review." (Yan Guozheng, June 18, 2021)

Algorithmic recommendation technology has changed the news distribution channels of traditional media. There are mainly three types of recommendation algorithms known to people: content-based recommendation algorithm, knowledge recommendation algorithm, and collaborative filtering algorithm. Toutiao is a combination of content-based recommendation and social recommendation. The more personalised the distribution of news content, the easier it is to meet users' needs.

Collaborative filtering refers to individuals' response to relevant information, such as scoring through a cooperative mechanism. After recording, the information is filtered and screened; the results are not necessarily limited to what people are interested in, but also what they are not interested, as it is also an important indicator of judgment (Wang & Zhi, 2016). In short, AI collects relevant information according to individual needs, intelligently analyses the information, and identifies the personalised and customised needs of users.

"When our users share or like the news information they are interested in on their personal homepage, the machine will automatically store the "sharing data" based on the social attributes of the individual, determine, and analyse the main source of data, and based on the social attributes of the individual, the machine will automatically share the data. After determining and analysing the main sources of the data, we will then target the users according to their social habits and interests." (Zhang Yi, June 12, 2021)

VR and AR technologies have transformed the news experience allowing for smart media platforms that combine multiple AI technologies. With the development and popularisation of Internet and digital media technology, audiences' habits of receiving and reading information have also changed. From the "logical thinking" of text reading in the

traditional media era to the "immersive experience" of audio-visual reading in the new media era, the audiences' demand for information has increased. As such, these changes in reading habits impose new requirements on the production of news content (Liang & Zheng, 2016).

Therefore, in terms of content editing and communication, news media must pay attention to the sensory experience and cognitive experience of the audience and highlight the "experiential" feature. Media outlets today have begun to explore VR and AR technologies to produce "immersive news", break through two-dimensional plane, open three-dimensional space, and create "immersive" sense of scene for users. "Immersive news" refers to the use of VR and AR technologies to collect and record news facts in a 360-degree all-round and three-dimensional way. After technical editing at a later stage, it presents a stronger spatial immersion effect, so that users can "enter" the news scene and become "directly concerned".

> *"There is also VR and AR, two technologies that allow news to be disseminated holographically, helping audiences restore the news scene and enter them for an immersive experience."* (Geng Chang, June 7, 2021)

> *"Our Xinhua News Agency has an intelligent media platform called "Media Brain", which allows the media to engage with AI technology in all aspects."* (Yuan Xun, June 27, 2021)

Impact of AI on news production in China

Positive impacts

AI not only transformed all parts of traditional news production but also liberated conventional productivity and production concepts. In other words, AI has made the sources of news information intelligent.

> *"The era of AI will lead to the further spread of the Internet of Things, and these objects can connect to the network with intelligent sensors, and they all have the potential to become collectors of information that human information collection cannot match, broadening the sources of information and reducing our workload to a great extent."* (Zhang Yi, June 12, 2021)

AI has also established a new way of collecting and editing information. The emergence of AI has changed the overall production structure, compressed the production process, reduced the need for human resources to be the middle link, and transferred the communication function to the machine which can act independently. The traditional way of communication has been "destroyed" and the use of technology to create a new way of communication has emerged.

> *"Our work is much easier compared to before because AI technology is involved in all aspects, and we just need to fill in the gaps of the technology."* (Yuan Xun, June 27, 2021)

AI has also led to a shift from "audience-centric" to "user-centric". The intervention of the AI technology has broken the fixed role of transmission and reception and the relationship between transmission and reception. The traditional fixed role of transmitter or receiver which was solidified in the two-way flow of information, whereby the

information transmitter is always the subject, has now become the receiver of information, and the receiver is redefined. This overlap of transmission and reception functions leads to multiple interactions of transmission and reception relations. This results in different transmission and receiving subjects and relations under different technical scenarios. The drift of the transmission function also affects the internal logic of each link of news production, and the evolution and innovation of news production are carried out under the overlapping and alternating transmission and receiving functions.

> *"In the past, news production was screened and gated by media gatekeepers, and this screening relied more on experience, based on a variety of factors such as media positioning, and less on audience factors. The current application of AI technology increasingly requires producers to have a user mindset and not just write news from their own perspective and with the rapid development of smart technology and the continuous integration of old and new media. The audience begins to change from a passive receiver to an active user. Their identity, role, status and function are changing subtly, which also brings significant changes to the news experience of the audience."* (Yan Guozheng, June 18, 2021)

> *"With the application of AI technology to journalism, the media carries out personalised production, vertically segment news content for audiences with different needs, and this makes a different content reach to different audiences with the advantage of channels."* (Zhang Yi, June 12, 2021)

AI technology also liberates productivity. As topics are selected through big data statistics as the starting point of the news production process, and with the help of intelligent data analysis technology, producers can anticipate the fervour of topics, find stronger directions and new angles for popular topics, discover new extension directions for old stories, and explore the value of cold topics (Han, 2018). The integration of cloud-based data and better human-machine collaboration obtains news leads and conducts automated interviews for information collation. Additionally, writing and editing are done with the assistance of automated news for accurate and personalised distribution.

> *"AI is now able to take on part of the work in journalism. AI frees journalists from the technical work and allows them to spend more energy on presenting content and improving news quality."* (Geng Chang, June 7, 2021)

Negative impacts

However, AI also brings with it a series of problems, such as ethical issues caused by algorithms as well as the "information cocoon" and "screaming effect" phenomena. With the development of technology, technological tools and business values have also produced certain contradictions, contributed to the emergence of fake news, and challenged the status of journalists.

AI also raises a number of potential social issues, such as the ethics of data algorithms. In the age of smart media, everyone's information is data and symbolised. While people may enjoy the convenience of big data, their personal information is being shared and stored in the cloud as a result. At present, there are very few laws and regulations governing online privacy leakage in China, and there are no regulations with regard to the process of collecting and using news data, which leads to privacy leakage of users. Wu (2017) put forward three major legal problems of artificial intelligence that China faces: the subject

qualification problem (subject qualification of intelligent robot as a person, or a machine) privacy problems (how to protect personal privacy), and the legal liability issues (direct damage caused by AI, and how to define the liable body).

> *"AI usually involves issues of personal information privacy when performing user data crawling and analysis. Because the user's personal information is hidden in the user data, and when a third party obtains this information, if it is not protected or used improperly, it can cause the leakage of personal information."* (Zhang Yi, June 12, 2021)

Personalised distribution is undoubtedly a direct manifestation of AI technology in the public, and a technological transformation that users can access at their fingertips. Personalised and accurate recommendations can reduce the push of invalid information to a certain extent and the best way to increase the stickiness of users, but such "intimate" care also has the risk of herding users into a "confined space". In this way, AI technology not only affects the information, but changes people's interpersonal communication and social composition.

A look at the content of major online media platforms reveals a lot of exaggerated headlines, sensationalism, and empty content, which however, get a lot of feeds. These types of information are usually not rational, are a form of emotional expression, portray one-sided interpretation, and some are even parodies or presented in a vulgar manner. This phenomenon is designed to take advantage of the "scream effect" in psychology.

> *"Current algorithmic recommendations are simply based on user behaviour and interests, which makes it easy for users to stay in one type of information environment for a long time and not receive other types of information."* (Yan Guozheng, June 18, 2021)

> *"Also beware of "unscrupulous" media that attract consumers' attention through pornographic, vulgar, curious and horror content to expand the user base and gain profit."* (Geng Chang, June 7, 2021)

After entering the age of intelligence, humans are now faced with the core problem stemming from the projection and conflict between intelligent technology and commercial interests in human ethics, namely the contradiction between tool rationality and value rationality (Chen & Zhai, 2018).

> *"It may also provide opportunities for people with ulterior motives, such as the previous Facebook data breach, where smart technology and business values clash."* (Zhang Yi, June 12, 2021)

The current model of combining AI and news production is monotonous as stated by the respondents. The robot reporter generates news stories simply by filling in data processing information in a system template. Although objective, it is difficult to attract readers. This news can only provide basic information and cannot meet the more high-level sophisticated needs of readers. Currently, writing robots are limited to topics such as sports and finance that require only simple data collection and information collation. Robot reporters are unable to carry out news writing for news commentary, on-the-spot reporting and in-depth investigation. In addition, in terms of news writing, robot reporters

are not sensitive to news and cannot actively discover news. They can only report specific content according to pre-set templates. Wölker's (2021) research confirmed that only for sports articles, was automated content perceived significantly more credible than human messages. Furthermore, credibility does not mediate the likelihood of news readers to either select or avoid articles for news consumption.

> *"Programmatic messaging is done by machine news writing, and as of now, reporting with thought and feeling, complex field descriptions, and in-depth reporting, machines are not yet able to do."* (Zhang Yi, June 12, 2021)

AI technology may also lead to fake news. As the production process of news relies too much on data, once the data is distorted, the content of the news will also lose accuracy. Algorithm-based news may produce errors because algorithms are programs developed in the computer field, and these programs are edited by people, who inevitably make mistakes, so the algorithmic technology is not completely 100% correct.

> *"There is also the fact that in today's world of smart algorithms and data, one cannot accept them all unconditionally and be alert to possible errors in the algorithms and data, which can bring about inaccurate journalism if the technology is flawed."* (Zhang Yi, June 12, 2021)

AI also threatens the job security of traditional media professionals. Although AI can save journalists from "sieving through a lot of data, and free them up to conduct more logical activities", according to foreign research and development departments in 2017, in 13 years, more than 800 million jobs will be taken over by robots, which means that about 20% of the workforce will be replaced. As such, many journalists are genuinely concerned about being replaced by robot journalists (Zhang, 2018). This correlates with Moran & Shaikh's work (2022) in the United States where they uncovered an ongoing discord between the industry and profession of journalism in highlighting the hopes and pitfalls of AI. This situation has also led to an intense discourse on AI's rightful place in news making, especially regarding the economic and contextual complexities in which news stories operate and the normative ideals of journalism in the digital era.

> *"Robots are able to work 24 hours a day, without providing additional overtime and at a relatively low cost. At a time when labour costs are gradually increasing, robots have their advantages, so AI actually threatens the status of our journalists."* (Yuan Xun, June 27, 2021)

Countermeasures

Addressing these issues caused by AI not only requires proper guidance from the government and mandatory law regulations, but also requires journalists to improve their media literacy to enable a moderate incorporation of AI, and upgrade of AI mechanisms in their work to adapt to the current complex news environment.

The respondents highlighted the following countermeasures to address the issues raised. Firstly, strengthen policy guidance and supervision. When news content producers use sensors to gather information, they need to find ways to circumvent leakages of data and information. Therefore, the media, government and enterprises should work together to standardise the data collection process and make it safe.

> *"Firstly, AI news development must adhere to government guidance and play an important role in policy support, market supervision and regulation making. The rapid rise of emerging media has produced many side effects, and it is urgent to strengthen the social governance of cyberspace."*
>
> (Geng Chang, June 7, 2021)

Secondly, an effective "human-machine collaboration" of double gatekeeping is required. Nowadays, all major news organisations in China use robot reporters. The combination of "manual production and machine distribution" is the common way most media carry out news production today. For journalists, the emergence of intelligent technology does create distress and consequences because the journalists are still not clear of their own role and responsibility in news production, and have to constantly relearn how to control intelligent technology. In the context of humans and machines co-existing, humans should employ their inherent value judgments and deep thinking. The machine should be made an auxiliary tool, and journalists can use the time saved by intelligent technology to prepare in-depth and effective news content, to gain the audience's attention.

If we blindly put technology first to cater to users and abandon the independent value judgment and guidance of journalists, we will deviate from the value of news and lose the core principle of journalism. Content push should only be done with an "editor-in-chief" at all times, and no matter how good the communication channel, there should always be a "gatekeeper". Even in an era where technology is king, the content cannot be completely determined by algorithm. In fact, human rationality and core values are required in every era. No matter how smart AI is, is it is only a tool that needs to be constantly upgraded. Only by truly realising the combination of journalistic professionalism, editorialism and algorithmic recommendations, can individual behavior ultimately return to the cultural, political, organisational and other constituents. (Zhang, 2017).

> *"Journalists and writing robots each have advantages and disadvantages that can complement each other. In the future of the news industry, 'artificial+' and 'algorithm+' will form a 'human-machine marriage', integrating the docking news production model."*
>
> (Yuan Xun, June 27, 2021)

> *"Although the specifics of the gatekeeper's job have changed in the AI environment, it should still be clear that the responsibility for news production rests with people. Machines are efficient and reliable assistants, but value judgments and final review cannot be fully delivered to them."*
>
> (Yan Guozheng, June 18, 2021)

The respondents also highlighted the importance of improving the ethical structure of journalism. According to Zhao (2018), the ethical structure of journalism is divided into three levels. The first is the personal ethical level — journalism professionalism and engineer ethics. Automated news platforms have incorporated many scientists and engineers into the field of news communication, as they are also involved in major decisions and management of the society. Their actions will have a greater impact on society, so they should shoulder more ethical responsibilities.

The second is the organisational ethical level — news organisations and Internet information platforms. In the age of AI, Internet information platforms need to clarify their ethical characteristics as they are a part of the news media entity. The ethical concerns of Internet information platforms mainly fall in the areas of data and algorithms.

Accordingly, Internet information platform companies need to uphold two forms of action for mass communication responsibility — self-regulatory systems, and professionalism.

The third is the social ethical level — political and public. In the political dimension, the government as the main ethical actor needs to understand the information-mediating effect of AI systems from the perspective of the overall social welfare and national information security, maintain ethical vigilance over their ability to guide public opinion and influence individuals, and clarify the boundaries of government control. On the other hand, the general public must acquire a clearer understanding about the mode of operation and social influence mechanism of intelligent systems so that individuals can use their power of reason to strengthen their own self-regulation and avoid losing their ability to pursue and reflect.

> *"To strengthen privacy protection in AI applications, it is necessary to strengthen the risk research and prevention of AI applications, to make comprehensive use of technological innovation, ethical norms, legal system and other means and methods to prevent its 'barbaric growth' and to ensure the healthy development of AI in line with ethical norms. "* (Zhang Yi, June 12, 2021)

In addition, design mechanics should also be optimised. Intelligent algorithms should fully understand user needs, combine user behaviour data and social relationship attribute data to provide interesting information according to user behaviour characteristics to meet their needs. At the same time, based on the user's social circle attributes, avoid the phenomenon of "information cocoon" caused by one-sided personalised push. Journalists should understand the process of AI news, the AI technology model, data collection, and use of AI in reporting news. Technicians also need to understand the concept of news value and introduce it into the initial stage of AI technology to realise the modelling of news values.

> *"In addition, the level of AI is still at the weak AI stage , but is rapidly evolving to strong AI, so it needs to be upgraded through technology to improve the learning ability of the machine and to strengthen the design mechanism for improving and optimising AI news."* (Geng Chang, June 7, 2021)

Respondents also mentioned the need for media literacy to be improved. The characteristics of social media communication also put forward new requirements for the media literacy of media professionals and the public (Yang, 2016). To elucidate further, journalists should possess political, legal and professional ethics as well as professional competence, which requires a clear understanding of the development trends of the intelligent media era and strong political awareness. The public also needs to acquire good selection, judgment, and identification skills to filter, identify, analyse, and judge the deluge of information they encounter on a daily basis. The increasing popularity of citizen journalism also requires the public to be responsible for the release of information and its dissemination, while strengthening their moral cultivation and social responsibility. The public should also improve their attitude, ability, and standard algorithmic literacy to identify, judge, and use algorithms. Other findings also suggest three subfields that are being actively developed in the media industry include machine learning, computer vision, as well as planning, scheduling, and optimisation. Other areas have not been fully deployed in the journalistic field (Santos & Ceron, 2021).

CONCLUSION

With the advent of Internet of Things, cloud computing, the use of big data, AI and VR/AR technology, journalistic intelligence still has a long way to go. Nevertheless, AI technology not only frees journalists from tedious work, but also improves the accuracy and timeliness of news. With this in mind, this paper focused on the transformative aspects of intelligent news production.

From the initial screening stage of news production, the changes of the screened news subjects, and in the era of the Internet of everything, the news screening channels have become more extensive paving the way for more opportunities of information collection. The process of information collection has changed to one of human-machine interaction, data mining, the application of sensors, drones and other instruments which have expanded its scope. Robot writing is widely used in news, which makes news editing easier. In news content expression, VR/AR immersive news reports, intelligent anchors who work 24 hours a day, personalised news content for different users, and real-time feedback have been achieved.

The innovation of the news production process under the influence of AI technology ensures a wealth of news sources, provides opportunities for automated writing, increases the engagement of the experience and the channels for feedback. It also widens the path to profitability for news production. These transformations have had a huge impact on the internal logic of news production. The value of news has been repeatedly defined in terms of its nature and has been improved in terms of timeliness and accuracy. The advent of human-computer interaction has also added new channels of communication, providing a new logic of communication and dialogue to future news production. It has also increased the productivity of news production.

However, intelligent technology is not perfect, and its use in news production has given rise to several issues. Privacy breaches, technical barriers to algorithmic technology, "screaming effect" and "information cocoon", contradiction between instrumental rationality and journalistic values, inaccuracy of news content and career concerns of traditional media professionals are all attendant issues to the development of AI technology in the field of journalism. These issues need to be addressed urgently, through measures such as policy guidance and regulation, integration and strengthening of human-machine collaborations, clarification of ethical structures, optimisation of news design mechanisms, and enhancement of media literacy.

As AI technology continues to grow and evolve, news production will continue to experience changes. In tandem, researchers will need to follow closely and study the development and trends of technology in news production as well.

References

Abdul Latif, R. & Oh, A. (2020). The Malaysian power shift: The mainstream perspective. *SEARCH Journal of Media and Communication Research, 12*(3), 145–161.

Ali, W., & Hassoun, M. (2019). Artificial intelligence and automated journalism: Contemporary challenges and new opportunities. *International Journal of Media, Journalism and Mass Communications (IJMJMC), 5*(1), 40–49.

Bass, A. Z. (1969). Refining the "gatekeeper" concept: A UN radio case study. *Journalism Quarterly, 46*(1), 69–72.

Chen, C. F., & Zhai, Y. J. (2018). Information bias and correction: Seeking value rationality in the intelligent era. *Young Reporter, 13*, 21–24.

de-Lima-Santos, M.-F., & Ceron, W. (2021). Artificial intelligence in news media: Current perceptions and future outlook. *Journal Media, 3*, 13–26. doi:10.20944/preprints202110.0020.v2

Glesne, C. (2016). *Becoming qualitative researchers: An introduction* (5th Ed). Pearson.

Han, B. (2018). Robotics journalism: Artificial intelligence and news production. *China Press*, p. 18.

He, Y., & Zhang, H.Z. (2018). Application of machine writing in the media industry. *Press*, p.3.

Lewin, K. (1943). Forces behind food habits and methods of change. *Bulletin of the National Research Council, 108*(1043), 35–65.

Lewin, K. (1947). Channels of group life. *Human Relations, 1*(2), 143–153.

Liang, Z., & Zheng, J., (2016). The impact and reconstruction of artificial intelligence technology on news production. *China Press*, p. 11.

Liu, B., & Wei, L. (2019). Machine authorship in situ: Effect of news organization and news genre on news credibility. *Digital Journalism, 7*(5), 635–657.

Moran, R. E., & Shaikh, S. J. (2022). Robots in the news and newsrooms: Unpacking meta-journalistic discourse on the use of artificial intelligence in journalism. *Digital Journalism.* Published online. https://doi.org/10.1080/21670811.2022.2085129

Pavlik, J. V. (2016). Cognitive computing and journalism: Implications of algorithms, artificial intelligence and data for the news media and society. *Brazilian Journal of Technology, Communication, and Cognitive Science, 4*(2), 1–14.

Pavlik, J. V. (2021). Engaging journalism: News in the time of the COVID-19 pandemic. *SEARCH Journal of Media and Communication Research, 13*(1), 1–17.

Peng, L. (2017). What will come from the meeting of "sensors" and "news"? *News Forum, 5*, 7–8.

QuestMobile. (2020). *QuestMobile's 2019 traffic growth inventory.* https://www.questmobile.com.cn/research/report-new/78

Shi, A. B. & Long, Y. F. (2016). The source of news robots, current situation and prospects. *Young Journalists, 22*, 77–79.

Shoemaker, P. J. (1991). *Gatekeeping*. Sage Publications.

Thurman, N., Moeller, J., Helberger, N., & Trilling, D. (2019). My friends, editors, algorithms, and I: Examining audience attitudes to news selection. *Digital Journalism, 7*(4), 447–469.

Wang, Y., & Zhi, T. R. (2016). The impact of robot writing on news production in the future: A review of Xinhua News Agency's "KuaiBi Xiaoxin". *Journalism and Writing, 2*, 12–14.

Washeck, A. (2014, June 25). Tow report: as sensor journalism rises, guidelines needed. *Media Shift.* http://mediashift.org/2014/06/forging-a-path-for-sensor-journalism/

Watson, Z. (2017). *VR for news: The new reality?* Reuters Institute for the Study of Journalism & Google Digital News Initiative.

Webster, J. (2017). *Attention marketplace: How to engage audiences in the digital age*. Renmin University of China Press.

White, D. M. (1950). The "gate keeper": A case study in the selection of news. *Journalism Quarterly, 27*(4), 383–390.

Wölker, A. (2021). Algorithms in the newsroom? News readers' perceived credibility and selection of automated journalism. *Journalism, 22*(1), 86–103.

Wu, H. D. (2017). Institutional arrangement and legal regulation in the era of artificial intelligence. *Journal of Northwest University of Political Science and Law, 5*(131), 23–24.

Xie, P. P. (2017). How to do a good job in news topic selection planning in the era of all media. *Audiovisual, 5*, 274–275.

Yang, W. J. (2016). Three kinds of media literacy in the era of social media and their relationship. *Journalism Research Guide, 21*, 106.

Yu, G. M. (2015). Machine news writing drives the new change of media. *News Editing*, p. 6.

Yu, G. M., Lan, M. N., & Li, W. (2017). Intelligence: the core logic of future communication mode innovation – and the basic operating paradigm of "artificial intelligence + media". *Journalism and Writing, 3*, 43–44.

Zhang, S. (2018). Limitations and countermeasures of news robot writing. *Young Journalists, p. 15*.

Zhang, X. X. (2017). The concept, significance, and ethical risk of algorithmic news personalized recommendation. *Media, 11*, 82–84.

Zhao, Y. (2018). Journalistic ethics in the era of artificial intelligence: Action and governance. *People's Forum*, p. 24.

Zhu, R. J. (2017). Innovative paths of new media news narrative strategy in converging media era. *Southeast Communication, 5*, 144–146.

Yang Xi

Attained her Master of Communication from Taylor's University. Currently, she is working at the Dance Academy of Sichuan University of Media and Communication, China. She can be contacted at cirilayang@163.com.

Roslina Abdul Latif

is a broadcast journalist by profession (TV3). Her research interests range from journalism to broadcasting, film trope and knowledge management. She is a columnist for Astro AWANI, BERNAMA and TV3 and has written for *StarEducate (The Star), High Ed, Pulse – Life and Times* and *Sunday Vibes (NST)*. She is also the author of *A Broadcasting History of Malaysia: Progress and Shifts* and several book chapters, locally and internationally. *Sidelines* was her debut in fiction writing. *Redamancy* which was launched on March 1st is her sequel.