

Examining Technological Adoption: A Preliminary Study of 5G and The Future of Radio in Indonesia

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Abstract:

Introduction: The following study investigates the impact of 5G technology on the radio industry in Indonesia with the focus on adoption and broadcasting.

Methodology: The research employed a qualitative research design focusing on a literature review approach. Data was collected from existing literature on the topics of current state of communication technology and 5G integration in Indonesia.

Results: Integrating 5G technology in radio broadcasting will augment content quality, programme diversity and audience interaction. 5G enables higher bandwidth, lower latency and fast data transmissions improving the overall audio and multimedia quality thus enabling a more immersive experience.

Conclusion: The study explores the potential of 5G technology integration in Indonesian radio sector outlining the opportunities and hurdles associated with the shift in technology. It offers a roadmap for radio stations to harness 5G's capabilities to remain competitive in an increasingly digital media landscape.

Keywords: 5G, radio, Indonesia, technology, digital media, IPv6.

1. INTRODUCTION

Digital strategies combined with ICT use by the broadcasting sector will shape future radio station development, which could have an impact on the radio sector, particularly 5G technology, in Indonesia. The future of today's radio stations will have to change the evolving habits of listeners in consuming media and compete with new media using digital technology, both individually and institutionally, compared to ten years ago. The rapid growth of Internet users has significantly affected digital transformation in Indonesia, with a 10.2% yearly increase signifying over 27 million more users (Hafizni & Fahmy, 2021). Internet connectivity growth has led to a notable rise in social media activity among a sizable portion of the Indonesian population actively participating on various sites. The pervasive influence of social media is the change in information-consuming behaviours and communication techniques. More Internet users have transformed Indonesia

into a profitable market for online business. Digital connectivity expansion has enabled the development of the digital economy, significantly affecting Indonesia Gross Domestic Product. (Kumala, 2022) The arrival of mobile technology has significantly changed the media sector, particularly the radio sector. This effect is clear in many respects, including changes in radio production, distribution, consumption, and business strategies. These developments are intimately related to the convergence of media, whereby digital technologies are integrated into pre-existing media formats; thus, changing the way information is processed, supplied, and distributed has a significant influence on media, particularly in the area of communication. Mobile Internet has become a ubiquitous service, changing how people run their businesses and organise their daily lives. Therefore, many mobile apps have appeared to simplify chores, including mobile purchases. The evolution of mobile and internet technologies has transformed the viewpoint of business channels. Rapid digital-age innovations have made

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mobile apps vital to consumers, thereby changing advertisers' marketing tactics (Baharuddin *et al.*, 2021).

The Internet is creating new avenues to deliver items as it combines with conventional media. Traditional media sources are exploring digital avenues for distributing materials (Shaoqing, 2020). New media platforms have emerged; mobile technology is driving the concept of mobility as a major component of media convergence. Mobile media has become a hot topic in recent years as a result of this development. Combining mobile phones, television, and the Internet produces mobile movies, which is a new means of delivering multimedia using mobile networks (Yijie, 2020).

Mobile technology has changed games for radio content by making it easier and more efficient to create and edit audio files. Even a few independent radio stations can produce high-quality materials using inexpensive digital recording and editing equipment. Radio has grown beyond its conventional limits to encompass both audio and multimedia materials with the development of upgraded mobile networks such as 4G and 5G. Consumers who use mobile devices and portable media now have access to radio shows at any time.

Exciting developments in the radio business are on the way with 5G, a fifth-generation wireless communication standard. Imagine a tailored and interactive listening experience, more interesting digital content, and improved broadcast quality. This is encouraging for the 5G technology. To offset the increasing complexity of multimedia applications, multimedia standards have been developed to span a wide range of fields, including coding, metadata, rights management, and content adaptation. Podcasting has become a popular way to listen to audio content, owing to the development of digital and radio technologies. Podcasting allows people and radio stations to share audio files, such as news, entertainment, and educational content, with a global audience (Chaves-Yuste & de la Peña, 2023).

The goal of this study is to find ways to make the most of 5G technology while also dealing with the challenges it presents. It looked at how 5G could affect Indonesia's radio industry, talked about the problems and difficulties in setting it up, and offered solutions.

The 5G technology has the potential to transform the radio industry in Indonesia in many ways. Thanks to 5G's better connectivity, faster response time, and wider bandwidth, radio broadcasts can be more effective and reach more people. Because 5G improves personalisation and interaction, radio stations may be able to have better relationships with their listeners. This will increase engagement, loyalty, and success of advertising campaigns. Mobile network operators now have an opportunity thanks to 5G. Because of these changes, radio stations may be able to offer more multimedia and interactive content, which listeners may find interesting and engaging. The global rollout of 5G technology has excited the future of 6G networks. These networks are expected to combine sensing, communication, processing, and control capabilities (Mahbub & Shubair, 2022).

By 2025, we expect to see more than six billion IoT devices connected *via* cellular networks from the 1.5 billion connections we presently have. After this surge, the cellular traffic increased

considerably. Fifth-generation mobile networks and those that will follow are being implemented with greater download rates and lower latency drives growing needs. This is essential for seamlessly connecting us with professional and social digital networks. (Lynch *et al.*, 2023) Moreover, connecting 5G networks with computational intelligence will allow the establishment of a basis for creating industrial digital twins (Zeb *et al.*, 2022). Smart infrastructure has grown and technology has become more efficient; hence, the advent of sixth-generation networks is unavoidable. 5G's ability to enhance the radio broadcast quality is one of its main advantages. With quick data transfer and minimal latency, 5G can enhance audio quality, reduce compression artefacts, and offer a more immersive listening experience. Furthermore, 5G can expand radio broadcast coverage, allowing stations to reach more people, particularly in remote and low-income areas. Consistent 1G to 4G mobile technology evolution shapes the future of mobile communication (Kumar, 2021).

However, it is difficult to incorporate 5G technology into the Indonesian radio sector. The need to build infrastructure 5G networks is a major challenge. Given Indonesia's large archipelago, particularly in distant and poor areas, ensuring total 5G coverage is difficult. The legal system governing radio-spectrum utilisation is another significant issue. The features of air-to-ground wireless channels make it difficult to guarantee communication between unmanned aerial vehicles and terrestrial ones. Moreover, 5G service-spectrum allocation planning and coordination are crucial for preventing interference with other wireless systems and radio broadcasts.

Indonesia's 2011–2025 Master Plan for the Acceleration and Expansion of Economic Development (MP3EI) was among the key initiatives. This strategy emphasises the need to enhance connectedness between nations. Building a consistent infrastructure is quite difficult given Indonesia's varied topography. Therefore, new plans are required to address logistical issues and guarantee connectivity in all places. To improve connectivity and accessibility, Nation's 2015–2019 National Medium-term Development Plan emphasises infrastructure development. It intends to promote the marine industry, combine rural and frontier areas, move transportation from roads to railways and ships, and address urban mobility problems.

Governments must cooperate closely with the radio sector to achieve technological progress. This cooperation can contribute to transparency, efficiency, and support of the regulatory process for innovative technology. Active involvement of all stakeholders, including regulators, in the IoT ecosystem, which is important in Indonesia, is required (Rahayu *et al.*, 2022). The management of spectrum resources based on IoT can produce improved service quality, reduced prices, and more output. Despite certain problems with the sluggish deployment of IPv6, Indonesia is on the road to becoming a digital government. Given the rising need for IoT devices and the requirement for strong network infrastructure, this is extremely worrisome (Aminah & Saksono, 2021). Among the sectors driven by Industrial Revolution 4.0 to embrace technology, particularly the Internet, are micro-, small-, and medium-sized companies (Julianti *et al.*, 2021).

This study emphasises how several company elements may be greatly affected by digital technology, especially the internet. This influences a company's operations, marketing, financial controls, and human resource management. The telecommunications sector is a significant driver of economic growth in Indonesia. The daily lives of the local people depend on communication technology.

Radio stations must consider 5G's potential to open up new distribution and programming forms. This encompasses a wide range of exciting possibilities such as materials developed specifically for mobile consumption, interactive television, and immersive audio experiences. On this day and in the age of ubiquitous mobile devices, people can tune into their favourite radio shows and podcasts from almost anywhere. Audience size and engagement can be enhanced using this new feature.

The spread of information and communication technologies seems to benefit working women in Indonesia more than men. Because of this technology, people are now better able to balance their work and family responsibilities. Under its "Making Indonesia 4.0" national policy framework, the Indonesian government prioritised this business. This moves highlights Indonesia's ability to increase economic development, productivity, and global competitiveness (Ratmono & Zuhrohtun, 2023).

If they want to take advantage of 5G networks, radio stations should first be trained and developed. When it comes to developing 5G technology, the Indonesian radio sector has encountered numerous challenges. Building reliable 5G infrastructure, particularly in rural and underserved areas, is of utmost importance. For radio stations to make the most of this new technology, there needs to be a simplification and modernisation of policies regarding the deployment of 5G and the allotment of the radio frequency spectrum. Financial incentives, technical support, and regulatory reforms from the government could ease the transition of the radio sector to 5G. With your help, we can overcome these challenges and get 5G up and running faster in Indonesia's radio sector. Businesses in Indonesia's creative sector suffer from a lack of technological knowledge and creativity as well as government regulations and protectionist fears (Gina *et al.*, 2021). Despite this, the sector substantially boosts the country's GDP.

Creative businesses have a significant potential to increase state income. However, they encounter various obstacles including government rules, concerns about protection, and the need for technical knowledge and innovation among industry actors. The Indonesian radio industry may improve its relevance, competitiveness, and impact on the media by using 5G technology and leveraging its power.

2. LITERATURE REVIEW

Scholars have started to think about and debate their basic values and use them as the fifth-generation standard, with studies now focusing on the next sixth-generation telecommunication system or 6G landscape. (Mizmizi *et al.*, 2021). Although its requirements span all vital aspects, not all

have to be met simultaneously, because different applications create different performance demands on systems; hence, 5G implementation includes disruptive elements.

The radio enterprises of many nations are still in the initial stage of the 5G rollout, as this sector has not yet fully adopted this technology. 5G networks' performance goals are higher data speed, lower latency, energy economy, lower cost, improved system capacity, and broad device connectivity (Jin *et al.*, 2021). Thus, the use of 5G technology by radio companies may be beneficial. However, certain difficulties must be resolved before such technologies can be fully applied. Improvements in 5G are expected to enable many revolutionary applications including virtual reality, driverless vehicles, and smart healthcare (Chen *et al.*, 2022). It is expected to significantly affect sectors including manufacturing, healthcare, and educational institutions, and can offer many vertical enterprises with notable benefits. (Jurva *et al.*, 2020). Indonesia must conduct a thorough SWOT analysis before implementing 5G technology (Lufianawati & Wicaksana, 2020). The country's infrastructure still needs significant work despite the benefits that 5G networks could provide.

However, several cases and trends were observed. The Republic of Korea has established itself as a leader in the global deployment of 5G technologies. Many Brazilian radio stations have begun testing HD Radio content on 5G networks. In particular, when the FM signals are poor, this innovation can offer outstanding audio quality and allow better interaction. Similarly, mobile network operators in Korea and New Zealand have started working with radio stations to add AM/FM radio transmissions to 5G digital streaming systems. This joint project allows people to engage with mobile platforms and to receive on-demand radio content.

5G and its networks have brought several interesting changes such as super-fast speeds, low latency, high dependability, reduced energy consumption, and universal connectivity. Among the numerous new uses, these developments have made self-driving cars, Industry 4.0, augmented and virtual reality, cooperative gaming, near-real-time remote surgery, and teleportation possible. Benzaïd & Taleb, 2020). As we approach 6G, our goal is to push beyond the limits of 5G and assist the next generation of applications and technology. Expected to have even better capabilities than 5G networks, 6G networks are expected to have a faster data speed, lower latency, and higher network capacity. (Wu *et al.*, 2021). These advances will make it possible to build more complex applications such as digital twins, extended reality, and holographic communications (Ridhawi *et al.*, 2023).

Now, we discuss how 5G technology could change the radio industry in Indonesia. It is a combination of good and bad. The main challenge is upgrading the current infrastructure and obtaining the tools and knowledge required to add 5G to radio operations. This requires a significant amount of money. This financial burden may be difficult for small radio stations that do not have sufficient resources. Radio stations must keep up with rapid technological changes. It is also difficult for them to acquire the right skills to use and control the five G-enabled

systems and equipment. However, mobile network operators disagree with this approach. As more and more people look for high-speed Internet with many multimedia features, there is a real concern that their income might not be enough to cover the costs of updating and maintaining the Internet infrastructure. The market is witnessing an increase in mobile devices and data traffic. Therefore, network operators need to find new ways to manage the spectrum and obtain the most of their networks. In some Western European countries, for example, experts predict that mobile data use will increase from 186 gigabytes per month to 12,540 gigabytes per month between 2010 and 2020. By 2025, the amount of data sent over mobile devices worldwide is expected to exceed 351 exabytes. This represents a 174% increase from 2020. Operators are thinking about new technology, improving their network infrastructure, and getting their employees ready to take advantage of 5G technology.

How have radio stations in Indonesia and around the world changed? Let's find out. Radio has proven to be very creative and resilient. Many people predicted that radio would become irrelevant because of new media. This research looks at what is happening now and the new things being used in radio stations in Indonesia. Digital radio has better sound quality, more stations, and fun features such as text and graphics. The DAB/DAB+ technology is not used in many countries, including Asia, Europe, and Australia. Podcasts and online radio have completely changed how people listen to them. These websites are available 24/7, provide a lot of information, and are easy to use, making them very popular. To reach more listeners and try new ways to share content, some radio stations have started creating podcasts and online radio shows. Radio and the Internet work together, especially when they are used together for marketing.

The radio industry has shown great adaptability as technology has changed over time. The change from analogue to digital streaming and mobile applications (apps) has been successful. Local language broadcasts on the radio are popular in many parts of the world, including Tamale Metropolis in Africa. They are popular because they are low cost and unifying. The growth of digital music technology and removal of regulations have led to a rapid rise in talk radio. However, there has not been a shift in public opinion towards conservatism. Now, we can discuss how the Internet and radio have come together to create powerful advertising tools. In today's fast-changing world of technology, the radio business has shown that it can adapt well. Online streaming, mobile apps, and digital platforms are all parts of traditional broadcasting. Radio is popular in places such as the Tamale Metropolis and other parts of Africa. It is popular because it is inexpensive and can unite people through local language broadcasts.

The expansion of talk radio is more about the combination of deregulation and broad usage of digital music technologies than about an increase in conservative opinions (Sikdar *et al.*, 2020). Local radio stations are built for the community by focusing on their own interests and experiences (Sharma, 2021).

The adoption of technology is the process by which people or companies begin to employ new technical developments.

Beginning with understanding the technology, a very complex procedure runs all the way to include it in daily operations. Many factors can affect this road, including the societal impact of the technology, its utility and simplicity, and access to the required tools. Advancements in communication technology have caused broadcast media to converge, which has upended our lives.

Indonesia has welcomed digital media, and this change is affecting how people search for information, particularly with the Industrial Revolution 4.0 (Nofiard, 2022). Formerly, a luxury Internet connection was now a need readily available *via* mobile devices. Indonesian consumers have turned social media into a key activity. The Ministry of Communication and Information Technology claims that Internet use has increased significantly among individuals. More individuals use digital media channels, such as podcasts, for both leisure and education.

Here, we examine how technology aligns with the concepts of uses and satisfaction. According to this theory, people actively seek certain forms of media to satisfy their requirements. How individuals choose to engage in various forms of media is relevant. How people attempt to make their occupations more efficient is at the heart of any discussion on technology. The adoption of new technologies has been the subject of numerous theoretical and conceptual proposals. Everett Rogers' innovation (DOI) is a famous theory that attempts to explain the dissemination of new ideas in a community. Another well-known idea that relies on people's impressions of a technology's utility and ease of use to predict its reception is the technology adoption model.

However, deciding to implement a new technology is not an easy task. People may try to prevent mistakes if they worry too much. In addition, employees accustomed to certain ways of doing things would be upset if the new technology interfered with their established procedures. To ensure seamless transition, new technology should be intuitive and well supported by training and guidance. Understanding the people who use the new technology, their requirements, and the current state of their technology is crucial for a smooth adoption process.

3. METHODS

This study used a qualitative method. A technique of investigation called Qualitative research investigated the complexity of human experiences and social events, and offered rich contextual insights. Gaining in-depth knowledge of complicated events and producing fresh insights are made easier using this qualitative research method. A literature review is a comprehensive analysis of the current information on a certain subject. The data analysis investigates journals and papers on technology adoption, selects pertinent journals and papers, and processes the data gathered from the chosen journals and papers.

4. RESULTS AND DISCUSSIONS

The rapid development of telecommunication technology has dramatically affected many aspects of human life worldwide, including the radio industry. One of the most recent developments in this area is the 5G technology, which has attracted significant attention. The 5G technology is a fifth-generation cellular network. It promises to be much faster, more reliable, and have more capacity than the previous generations. 5G technology has a very low latency, which allows almost real-time communication. This opens the door to creative uses in many fields such as healthcare, transportation, and entertainment.

Owing to 5G's lower latency rates, we can now communicate in almost real time. This opens up exciting new possibilities in the healthcare, transportation, and entertainment industries, among others. With 5G's faster speed, users can stream high-quality videos and music without interruption, thereby improving their experience. 5G networks can quickly transfer considerable amounts of data. This allows live events and interactive programs to be broadcast without interruptions. Technology has both advantages and disadvantages; however, it is important for reading and education. Podcasts are becoming increasingly popular as a way to encourage people to read and learn more. This is because they offer information that people can listen to anytime and anywhere. An adaptable platform that delivers instructional information accommodates various learning preferences and styles. Next, we discuss the 5G radio technology. This may offer several benefits, including the ability to evaluate 6G wireless technologies using studies on 5G technology costs and benefits. With 5G's improved audio quality and more reliable broadcasting, there are exciting new possibilities for radio. 5G can make it easier to listen to the radio because of its high bandwidth and low latency. This improves the radio listening experience for listeners. (Shen *et al.*, 2023) say that radio stations can use 5G technology to create and share interactive content like live polls, quizzes, and Q&A sessions. This would make listeners more interested and engaged. Users are more likely to stay if they can access content that is customised based on their preferences and listening habits. With 5G technology, radio stations can generate money in new ways, such as targeted ads, premium content, and data analysis. Radio stations can use 5G to share content more efficiently and affordably, reach more people, and make better use of resources. The improved 5G technology allows for a steady flow of high-quality multimedia content to radio listeners. This provides a full and interesting listening experience with HD audio, video, and interactive features. In addition, with more 5G coverage and better reception in buildings, radio stations can reach more people. 5G will create new services that allow radio stations to offer special features to listeners. These features include location-based programming, real-time interaction, and personal recommendations.

Wireless communication systems combine wireless and optical domains to increase network performance and capacity, thereby improving issues such as spectrum-use efficiency, network capacity growth, and seamless integration of imaging with wireless communication. As we are near 6G networks,

several significant technologies are being developed. Among these is the mix of electromagnetic information theory, which aims to solve the challenges of seamless coverage and channel state information acquisition in a three-dimensional space (Wang, 2024).

Reconfigurable intelligent surfaces have become increasingly common. They provide a clever means to manage the wireless environment, which can enhance coverage and signal quality. Experts are looking forward to 6G networks as 5G technology is spreading worldwide. These are expected to integrate control operations, computation, communication, and sensing (Mahbub & Shubair, 2022). Building 6G technology will require more sophisticated orchestration, control systems, and standardisation to manage the complexity resulting from combining different technologies and infrastructure (Trommler, 2022). The telecom scenario is changing rapidly because 5G technology is leading the way, and 6G technology is approaching. Recent figures show that by 2025, the number of IoT devices connected *via* cellular services will reach six billion, a significant rise from the 1.5 billion connections we now have (Zeb *et al.*, 2022).

These problems must be addressed using a comprehensive approach, as well as the correct application of 5G technology in the radio domain. Many key elements of this procedure were also included. First, the benefits and disadvantages of 5G technology in radio environments must be fully understood. Achieving this goal will be aided by further research and collaboration with other industrial partners. Next, designing a strategic plan for 5G adoption requires the consideration of regulatory compliance, integration with existing systems, and infrastructure investment, among other aspects. Engaging with authorities and lawmakers helps ensure favourable regulatory conditions and spectrum allocation policies supporting 5G development in the radio industry.

A seamless transition relies on the use of effective change management strategies. This includes staff training, audience participation, and seamless integration of new technologies. The encouragement of industrial cooperation and knowledge sharing also influence the use of best practices, pooled resources, and group learning. Several countries are actively developing 6G networks. Projects like China's "6G Wireless Technology Task Force, the U.S.'s Next G Alliance, Japan's Beyond 5G Promotion Consortium, Europe's Hexa-X project, and South Korea's 6G implementation plan (Chen, 2003) emphasise the global awareness of the relevance of 6G technology in shaping the future of wireless communication. Every decade, new generations of mobile communication technologies have been introduced, each delivering notable features and performance improvements. 5G, defined by greater bandwidth and cheaper energy prices, is a significant advancement (Kumar, 2021). This is expected to revolutionise mobile communications and transform the operation of mobile devices. With the radio sector as no exception, 5G networks have created many technological innovations and opportunities in various industries. The rollout of 5G networks in the radio sector presents an opportunity to enhance audio quality, expand

coverage, and offer innovative services. However, the extent to which the radio industry uses 5G technology depends on a thorough review of the infrastructure, as well as regulatory and implementation-related issues and components (Rasti *et al.*, 2021).

4.1. Technological Factors to Think About

There are a number of important technological concerns that arise with the implementation of 5G in the radio business. Before 5G is used, radio stations should learn about its clear advantages such as faster data transfer rates, lower latency, and higher quality streaming. The way radio stations are set up and operated now, including how they manage content, distribute it, and transmit it, should be able to use 5G technology. In addition, radio stations must spend money on training and education. This will help them deal with new issues that arise with 5G technology. Some of these issues include network installation, spectrum management, and security regulation.

4.2. Financial Factors to Think About

People are discussing how important it is to think about money when introducing 5G technology to radio companies. However, there are concerns regarding the overall cost of owning one. This includes infrastructure costs, subscription fees, and daily operations. It is important to calculate the return on investment (ROI) when operating a radio station. According to (Lynch *et al.*, 2023), businesses should consider how 5G can increase revenue and decrease cost. Radio stations can obtain money to build 5G infrastructure through government subsidies, tax refunds, and other financial incentives.

4.3. Business Problems

The introduction of 5G depends on the resolution of numerous organizational difficulties in the radio sector. Attitudes toward risk, how prepared an organisation is, and how much risk it can take are all part of this category. Managers of radio stations should be hopeful about 5G technology. They should talk about how 5G can get listeners involved and strengthen competition. Businesses should evaluate 5G readiness by examining three aspects: technological expertise, infrastructure, and employee training. There are many unknowns regarding 5G deployment that radio stations need to consider. These problems include technological, security, and regulatory challenges. Therefore, it is important for them to be willing to take risks.

The increasing need for high bandwidth owing to the growing number of wireless applications has led to specific requirements for 5G such as very low latency and networks with a high density of connections. Applications such as cloud radio access networks and coordinated multipoint systems are primarily responsible for the demand for reduced latency and exact synchronisation. We may not be able to use a Common Public Radio Interface protocol to deploy widespread 5G networks. Therefore, scalable and efficient alternatives are

required. The 5G architecture brings the radio access point closer to that of the end device. This simplifies the final communication link, helps lower latency, and enhances dependability. This is particularly useful in areas where there is no infrastructure on the ground. In such cases, satellite backhauling is a practical way to connect distant locations. Setting up drone-charging stations in remote areas can improve cell phone services and help people who do not have access to technology (Qin, 2022). Drones can provide better Internet access in places without a traditional infrastructure (Wang, 2024).

4.4. Environmental Elements

When adopting 5G in the radio sector, it is important to consider several environmental factors such as government policies, competition among industries, and consumer preferences. The speed at which 5G technology is implemented can be significantly influenced by the laws and regulations. These regulations include those that govern 5G spectrum allocation and standards created for 5G. In a competitive market, radio stations may feel that they need to use 5G to stay ahead and meet the changing needs of their audience. Thus, it is important to consider what consumers like. Radio stations may feel pressured to adopt 5G technology because people want better audio, personalised content, and interactive experience. 5G networks can change many industries such as transportation, entertainment, and manufacturing. It has potential uses in self-driving cars and remote monitoring, as well as in creating immersive augmented reality experiences (Pinola *et al.*, 2022). We can see the usefulness of 5G in smart cities and industrial automation. Based on predictions, 5G can be used worldwide to create smart networks (Chowdhury *et al.*, 2020). As 5G becomes a part of healthcare, industrial processes, transportation services, and entertainment, it puts considerable pressure on the current network infrastructure. Simultaneously, it creates new economic opportunities for network operators. With 5G, cell phone companies can create new apps and services such as the Internet of Things, virtual reality, and augmented reality.

4.5. Critical Problems and Opportunities

The results show important issues and possibilities related to the use of 5G technology in the radio industry. People are concerned about privacy and security, and the cost of the infrastructure is very high. Common issues that users face are handoff problems, security and privacy concerns, poor service quality, increased consumer costs, complicated infrastructure needs, limited network spectrum, and mobile phone prices (Pereira *et al.*, 2022). We must thoroughly evaluate the potential dangers associated with 5G technology. The need for 5G infrastructure creates a significant problem, particularly for smaller radio stations. Data security and user privacy are now top priorities in the development of 5G networks. Because data are important, radio stations must take additional steps to protect them.

Despite these challenges, 5G has the potential to offer several benefits. Some of these changes include promoting new

ways to share materials, improving sound quality, and involving audience members. With 5G networks, radio stations can provide listeners with better audio, faster internet access, and less delay, all of which improve the listening experience. With 5G technology, radio stations can now provide personalised and interactive programming. This includes features such as targeted advertising, personalised playlists, and real-time feedback. Radio stations can protect confidential information by creating strict rules. They can also use 5G networks to reach more people on different devices such as smart speakers, mobile apps, and websites. This enables them to reach more people and earn more money.

CONCLUSION

Businesses can now make decisions and perform predictive maintenance, because 5G can process and analyse data in real time. The impact of 5G on the wireless industry is notable, showing both possibilities and problems. Many industries, including construction, can benefit from 5G mobile networks. 5G technology could also change industries, such as healthcare and parking systems. Radio stations should consider how 5G can be used, even though there are concerns about how much it will cost, how well it will work, and how safe it will be. This technology has many benefits such as better sound quality, more interaction with listeners, and new ways to share creative content. By examining current literature, case studies, and expert opinions, we can observe how 5G has influenced various sectors. The use of UAVs to implement 5G wireless networks presents an opportunity to improve connectivity, particularly in areas with a poor infrastructure. The deployment of 5G requires proactive networking to predict the network conditions and ensure optimal connectivity. This technology has the power to transform sectors and strengthen bonds, thereby influencing communication and technology.

5G's high data rates, especially in the millimetre-wave range, suggest that antennas must have notable gain and enhanced directivity because of significant atmospheric absorption. The introduction of artificial intelligence into research fields is expected to have a major impact, possibly leading to pilot projects and their implementation in digital campus settings. 5G is a good candidate for next-generation wireless communication systems because it can support large multiple-input multiple-output systems, thus increasing the data speed without using more bandwidth.

RECOMMENDATIONS

Some recommendations were made based on the results of this study.

To prepare for the 5G era, radio stations must improve their technology. This means that they might have to upgrade their current equipment, obtain new 5G-ready devices, and apply strong security measures to protect their networks. Radio stations should have plans to use 5G technology in their daily operation. This approach should include staff training, reorganising the company, and creating new business models that use 5G technology. The text has now become simple.

We now discuss these policies. Lawmakers and regulatory bodies should encourage the radio industry to adopt 5G technology to create a favourable regulatory environment. This could lead to greater investment in 5G infrastructure, fair competition in the market, and easier permission and approval processes. The radio industry can benefit from 5G's potential by following these recommendations. This will improve the listening experience, encourage new ideas, and help radio stations to remain competitive in the media landscape.

AUTHORS' CONTRIBUTIONS

H. and B.O. contributed to the design and implementation of the study. H. contributed to the analysis of the results and the writing of the manuscript. B.O. conceived of the original study and supervised the project.

ETHICAL APPROVAL & INFORMED CONSENT

All procedures were carried out in accordance with institutional research ethics committee guidelines and Declaration of Helsinki. Informed consent was obtained from all participants. To ensure participant protection, all data were fully anonymized at the point of collection, and no personal or identifiable data was recorded.

AVAILABILITY OF DATA AND MATERIALS

The data will be made available on reasonable request by contacting the corresponding author Harliantara.

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CONFLICT OF INTEREST

The authors declare no conflicts of interest, financial or otherwise.

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DECLARATION OF AI

During the preparation of this work the authors used ChatGPT for editing purposes. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.

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