



Digital Migration and its Impact on the Programming of State Broadcaster: Case of Radio Pakistan

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ABSTRACT

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This study investigates Radio Pakistan's digital transition and its effects on programming. Radio Pakistan has embraced digital migration as a result of the quick transformation of traditional broadcasting methods brought about by the arrival of digital technologies. This change involves transmitting in analog to digital format and integrating digital content delivery channels including podcasts, internet radio, and mobile apps. The study looks at how the shift to digital media has affected programming approaches, with a particular emphasis on content variety. Besides, paper discusses how diverse technological evolutions have shaped public perception in a constructive way and what role Radio Pakistan, as a public broadcaster, has played in this regard. The paper also looks at the reasons for the paradigm shift of the broadcast media industry from analogue culture to a contemporary digital world through an extensive literature review and theoretical analysis using interview guide a tool of data collection. The study provides guidelines to policy makers of Radio Pakistan, executive of a community radio station, a media educator of Pakistan to understand the affected by these historic developments and expedite the expansion of DRM plan which is underway with slowest pace.

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1. Introduction

In the current mediated age, media plays a significant role in defining our realities of the social world (Okocha, Yousaf, & Onobe, 2023; Williams, 2003; Yousaf, 2023; Yousaf, Hu, & Raza, 2023). The media outlets are being digitalized and made accessible to the masses. Digital migration is a process of transforming analog data into digital data manuscripts, books, photos, maps, audio recordings, motion pictures, ephemera, and other things that might be transformed (Balarabe, 2013). It is the changeover or migration from broadcasting in analog to broadcasting in digital format. Digital migration in the broadcast industry is a growing phenomenon due to its numerous advantages over traditional analog broadcasting. Currently, the majority of radio broadcasts working under the Ministry of Information and Broadcasting Government of Pakistan are set on analogue mode of transmission. Whereas, Pakistan is far behind to compete with international broadcaster, in terms of quality programming and its reach to audience across the globe. This big gap is making State-Broadcaster feeble in its Air-wave Network. Because of this gap Radio Pakistan can't use its world and external services effectively. A report ITU (2023) on the transition from analog to digital broadcasting by international communication was released in an attempt to provide an overview of the digital switch-over situation worldwide and mention its advantages over analog systems. The report discussed "why digital" and its technical considerations justified that more control over channel performance is one of the main

advantages of digitization. The features of an analog radio communications channel mostly determine its overall performance. There is little room for making use of the "trade-offs" that are implied by Shannon's Theorem. On the other hand, the quality of the conversion operations (from analog to digital and vice versa) determines the overall performance of digital systems as long as the channel's capabilities are not surpassed. The shift of the Broadcast Industry into digital means notable gains in viewer engagement, operational effectiveness, diversity of material, and service quality.

Conforming to European guidelines, beginning with January 1, 2012, and analog T.V. broadcasting ought to be totally supplanted by advanced broadcasting in many parts of Europe, particularly in Romania. Besides, the majority of Southern African nations have advanced well and are nearing the end of their digital migration. However, some nations are having trouble because of their limited resources and lack of motivation to follow SADC and ITU regulations. The process of digital migration in African countries started soon after broadcasters realized that there was a better solution than the existing analog system of radio/T.V. broadcasting to reach the entire population of the region. So, switch-over from analog transmission to (DRM) digital radio Mondiale is a must. The Geneva 2006 agreement served as the impetus for the Nigerian Government's 2009 action on the white paper. It stressed that all participating countries must obligatorily transition all Ultra High Frequency (UHF) and Very High Frequency (VHF) terrestrial broadcasting from analog to digital transmission by June 17, 2015, and June 17, 2020 (Aihe, 2008 June 11). Nigeria could not afford to lose this chance, so the country's then-president, Alhaji Umaru Musa Yar'Adua, embraced the idea of switching from analog to digital broadcasting in Nigeria starting on June 17, 2012, in accordance with ITU resolutions (Omale, Ekhareafo, & Essien, 2018). Likewise, notable trends and advancements in broadcasting solutions are being seen in the Middle East market, which reflects the region's increasing desire for better communication and high-quality content. With an emphasis on the growing need for 10G Ethernet cards, we will examine five instances and provide five sets of market statistics in this piece to show how the Middle East's broadcasting solutions are changing.

Rise in OTT Streaming Services: Over-the-top (OTT) streaming platforms are gaining popularity in the Middle East, driving the need for advanced broadcasting solutions. These platforms require high-speed networks, making 10G Ethernet cards essential for uninterrupted streaming experiences. Besides, remote production workflows allow for more cost-effective and flexible content creation. Middle Eastern countries such as Bahrain, Saudi Arabia, and the United Arab Emirates are investing in sports and eSports and hosting major events and tournaments (World Economic Forum, July 18, 2023).

The process by which broadcasters all over the world are moving Analog signals to a well-organized, digital Network is on with steady pace. African State Broadcasters are classic example in this regard. The countries who have shifted their transmission to digital mode have significant impact on programming production consumption. A few years ago, All India Radio (AIR) started transmitting digital radio in DRM format, an open standard technique for digital radio broadcasting called digital radio Mondiale (DRM). AIR now operates a huge network with 35 powerful Medium-wave digital transmitters and shortwave transmitters. All these station are operating under Prasar Bharati, a digital network of All India Radio. In this respect, AIR is a lot ahead and has added more transmitters to its DRM. All India Radio is moving forward with its digital radio transformation. AIR Bangalore can be heard almost everywhere in Russia. AIR Mumbai has started testing in DRM mode at 1044 kHz, and the Asmita channel is open for simulcast on DRM mode at 568 kHz; AIR Jabalpur has stated that it is ready for digital radio transmission. At the same time, more stations are getting ready to start doing digital broadcasts as well. In India, there have been more than six million branded cars with DRM built-in using it for infotainment systems, including Maruti Suzuki, Hyundai, Toyota, M.G. Motors, Mahindra, and Mercedes Benz (DRM, India). Currently, AIR is operating 41 high-power DRM medium wave transmitters across India. Four big cities carried pure DRM transmitters, each in the city or near the metro territory (DRM, 2024).

Similarly, the process of switching broadcast transmissions from analog to digital has begun in South Africa. The International Telecommunications Union (ITU) resolved that nations should switch from analog to digital broadcasting. The primary motivation behind the digital transition of broadcasting is to free up valuable spectrum for other uses. Since the spectrum is limited, we must use it wisely to accommodate additional television and telecommunications

services. According to the report of Department of Communications and Technologies, Republic of South Africa, the broadcast industry of South Africa has taken a step in the right direction towards digital migration, as can be seen by the fact that all the countries in the region have migrated or are in the process of migrating to digital terrestrial broadcasting. Shifting from analog to digital transmission was adopted by public sector broadcasting and private media channels in Pakistan quite late compared to neighboring countries like India, China, and Malaysia. To compete with the world and to defend its geographic importance, Pakistan has now decided to digitize the state-owned radio by introducing the latest technology in different sectors with the purpose of expanding its transmission within the country and across the border with better reception of programs. To convert all analog stations into a digital format, the government announced the Digital migration policy of Radio Pakistan on December 24, 2019. As per a report published in Dawn, the policy would be implemented in three different phases at the cost of Rs .995 billion. The project will be completed in six years (Gupta, Dhurandher, & Kumar, 2019).

In 2010, Pakistan Broadcasting Corporation, also referred to as Radio Pakistan, began incorporating web-based technology into its programming. Garden Radio Apps are being used by Radio Pakistan's medium waves and F.M. broadcasts to enhance their reception and grow their audience globally. With the Federal Government's assent, "digital Pakistan decided to migrate Radio Pakistan entirely to digital format and launched three programs, Phases 1 through 3," according to the vision (Sheikh, Hassan, Tariq, & Zia, 2023). Caretaker Information Minister Murtaza Solangi says Radio Pakistan is moving towards Digital Radio Mondiale Technology to bring its broadcasts up to international standards. In this regard, the national broadcaster has achieved many milestones in its long journey of digital migration. It has also taken effective steps to digitalize its entire archives. On July 30, Marriyum Aurangzeb, Pakistan's Minister of Information and Broadcasting, launched a project to install a 1000-kilowatt Digital Radio Mondiale (DRM) transmitter at the HPT compound in Rawat, Rawalpindi. The project, costing 4 billion Pakistani rupees, is expected to be completed in two years and significantly enhance Radio Pakistan. Ms. Aurangzeb stressed that Digital Radio Mondiale technology is essential for modern broadcasting, as analog and shortwave technologies are outdated (DRM, 2023). Trillion of dollar capital market business is one of the functional commercial activity which runs across the world. Unfortunately, this segment is missing in Pakistan and confined to narrow casting (Ahmad, 2015). Due to the financial crunch, the installation process of new DRM transmitters has halted. Pakistan is the only country in the region where state-owned media is not incorporated into the digital migration policy of the International Telecommunication Union and European broadcast standard. Radio Pakistan is still using analog shortwave technology, which needs to be updated. Since Pakistan became the member of DRM Consortium It is encouraging that Radio Pakistan is making slow but good headway

Impact of Socio-economic and Cultural impact of Digital migration: The digital revolution and growth of the media industry have transformed the media business and other industries globally. New business models have been developed and all kinds of new products and services have emerged. Despite the fact, the countries that were economically feeble and have fewer resources are making good headway in socio-economic sector and contributing their role in national development. China, Malaysia, Singapore, Japan and Germany, in the west are the examples where an economic boom came due to the joint effort of government- media partnership. With improved digital signal, Radio Pakistan can also manage its world and external transmission on business model. This paper addressed the gap and investigated the reasons why Pakistan is left behind in the region, where the pace of shifting analog Transmission to Digital could be faster. It also presented some useful suggestions related to the benefits of joining the DRM Consortium. Therefore, this essay scrutinizes the following objectives:

1.1. Objectives

- To realize the government's goal of removing the obstacles hindering Radio Pakistan's transformation into a National Institution and a well-equipped Public Sector in Asia.
- To overcome challenges and facilitate the transition to digital radio in Pakistan, a well-planned, coordinated effort from government agencies, broadcasting authorities, industry stakeholders, and the public is needed.
- Digital migration The Immediacy is the main feature of digital communication. To bring Pakistan closer to the developed world through digital transmission is a need of hours,

and the government, along with stakeholders, should complete this project on a priority basis.

- The Government of Pakistan and UNDP also work together in the Digital Media Development Programme for youth skills development.
- To investigate the progress made by Pakistan Radio in adopting Pakistan's digital migration policy.
- Enlarge the choices available to the people of Pakistan to get maximum information and entertainment with a clear reception of radio signals.
- To accelerate the digital migration procedure of radio broadcasting and bring Pakistani broadcast media to par with international standards.

2. Literature Review

Digital migration in the broadcast industry brings significant improvements in service quality, operational efficiency, content diversity, and viewer engagement. It not only enhances the viewer experience but also supports the growth and sustainability of the broadcasting sector through technological advancements and new business opportunities. Despite the challenges associated with the transition, the long-term benefits make digital migration a critical step for the future of broadcasting. On February 22, Media School posted a report on Beonair Network's website. In-band on-channel, or IBOC, is a hybrid way of simultaneously delivering digital radio and analog radio broadcast signals on the same frequency. Next is DAB (Digital Audio Broadcasting), which is sound that is sent digitally. Terrestrial sound broadcasting and integrated services digital broadcasting are known as ISDB-TSB. Since its launch in 2003, digital broadcasting technology has been widely used in Japan. A freely standardized digital broadcasting technique that works on all broadcast frequencies is called digital radio Mondiale (DRM). They are all different from each other in a variety of ways. Three years ago, Radio Pakistan joined the DRM Consortium as part of its digital migration agenda, a long way behind the global average. In 2003, it was first often used. In the United States, almost 2,000 AM and F.M. stations currently use the IBOC digital radio services. In the United States, where the FCC controls the media spectrum, F.M. bands are used by most H.D. radio stations, and most of those stations currently offer one or more multicast services.

The media school report, which was released in February 2022, states that the IBOC stations transmit their primary content in both digital and analog modes. Thus, they are employing the same broadcast channels to provide services to both old and contemporary receivers. Many national dailies criticized a late initiative by Radio Pakistan to adopt a digital migration policy. According to the nationally recognized national daily (Sheikh et al., 2023), the official spokesman for Radio Pakistan has lost credibility as a result of the management and Ministry of Information and Broadcasting's nonseriousness approach. Poorly managed, this national institution should have paid salaries and pensions to its employees in December 2022 and February 2023 due to a severe financial crisis. The report showed its fear that If the present government, which took charge in March 2024, could not manage to generate funds, the delay in the digital migration strategy could cause great harm to the country. Basra is optimistic. "There is a little improvement seen after the new government of PLM (N) took the charge." However, those who live in rural areas and depend solely on radio programs as their primary information source may lose this fundamental freedom if financial constraints exist.

2.1. Digital Migration in Pakistan

Radio Pakistan has decided to use the best streaming devices in the upcoming years due to the diversification of the newest technology and its application in various program formats. Thanks to webcasting, radio transmission is now more accessible to everyone with a computer. Yasin (2020) reported in the country's popular English daily, *The News*, that the Government of Pakistan has allocated an estimated Rs176.882 million to modernize its public sector broadcasting and start pure digital transmission on its available network. Phase 2 would see a quick jump to install the largest 1000-kilowatt DRM Medium-wave transmitting station of state-run Radio at Fort Monroe hill station in the Dera Ghazi Khan District of South Punjab, at an estimated cost of three billion rupees. The nation's center will host the nation's first-ever, most potent digital radio transmitter operated by the state. Concern administration is trying to get some funding from foreign donors to carry out this massive plan. If this initiative succeeds, Radio Pakistan will be able to reach all of the important locations, including China, Iran, Bangladesh, Afghanistan, India, Centre Asia, and the Middle East, with this potent digital transmitter. Besides, Pakistan will be able to target the audience at home and abroad, including South Asia, Central Asia, and the

Middle East, through quality news, current affairs, and programs. The government is quite optimistic about completing the Phase -11 project before 2026. An amount of around Rs.3153 million has already been allocated for this project. Five DRM+FM transmitters of 10 kilowatts will be installed in Islamabad, Lahore, Karachi, Faisalabad, and Multan at the existing radio stations. The plan also covered the Balochistan Peshawar, Gilgit-Baltistan, Azad Kashmir, Sindh, and some rural areas of Punjab) is also part of this plan. Under Phase III of Radio Pakistan's digital migration plan, the transmission network will be modified with the induction of an additional four digital transmitters, each with a power of 100 KWs, in the Punjab region and some strategic areas in Peshawar. The projects are expected to be completed in 2025 (Shahid. Saleem (Deputy Controller Engineering). Besides, 100 kilowatts each will be installed in Lahore, Skardu, Quetta, and Peshawar for strategic purposes. The projects are under completion.

The advantages of DAB and DRM: The transmission mode of DAB and DRM is dissimilar to F.M. and shortwave broadcasting. For example, the sound that is sent over radio waves can be altered as per location requirements. In European countries, DAB is widely used by broadcasters. These advances increase the range of DAB broadcasts. Currently, 40 nations throughout the world (mostly in Europe) have DAB services, and others are thinking about implementing it or one of its variants. The DRM is actually intended to take the place of AM and shortwave broadcasts. Under some circumstances and with some adjustments to the analog service, a DRM broadcast can share a channel with an analog station. Compared to traditional radio broadcasting, DRM is a smart, quick, much more developed, and adaptable broadcast technology with energy-efficient quality (Obreja, 2023, May 15). Digital broadcasting has created new opportunities and expanded the listenership and viewership with much better sound and picture quality. Besides, it has increased programming options, enhanced accessibility and superiority, and the development of new media services, all made possible by terrestrial digital television. Digital radio provides new multimedia features and enhanced sound and reception. Receivers may, for example, have screens that transmit text and graphics for instance, song or program titles. Radio Pakistan plans to employ the greatest streaming devices in the upcoming years through the adoption of the newest technology and its implementation in various program forms. Anyone with access to a computer can now more easily access radio transmission thanks to webcasting. In 2010, Pakistan Broadcasting Corporation, also referred to as Radio Pakistan, began incorporating web-based technology into its programming. Garden Radio Apps are being used by Radio Pakistan's medium waves and F.M. broadcasts to enhance their reception and grow their audience globally. As to the plan, "Digital Pakistan decided to fully migrate Radio Pakistan to digital media through the phase 1 and phase 11 DRM (Digital Radio Mondiale) Plans" (Sheikh et al., 2023).

2.2. Why was digital migration initiated in State-owned Broadcaster Radio Pakistan?

- Terrestrial digital television makes expanded programming options, improved accessibility and quality, and the development of new media services possible. Digital radio provides new multimedia features and enhanced sound and reception. Receivers, for example, can be fitted with displays to send viewers eye-catching visuals and legible text.
- Conforming to European guidelines, beginning on January 1, 2012, and analog T.V. broadcasting should be supplanted by advanced broadcasting in many parts of Europe, particularly in Romania. Eventually, analog transmission was suspended in the European region in 2015, and it became necessary for the stations to make the complete transition to digital technology and utilize Internet protocols for broadcasting and different compression methods.
- Shifting from analog to digital transmission was adopted by public sector broadcasting and private media channels in Pakistan quite late compared to neighboring countries like India, China, and Malaysia. After the announcement of the U.K., Corfield (2020, July 3) reports that the U.K. government has decided not to proceed with its initial plan to eliminate all AM and F.M. radio broadcasts in favor of DAB digital radio. Instead, they have opted to extend the use of analog services for another ten years, postponing the shift to a completely digital audio broadcasting system. However, "Local DAB in services in Britain are projected to target about 90 percent of families and around 76 percent to those who travel via cars and buses on motorways and dual carriageways with national BBC services reaching around 7-10 percent more than that (OfCom.).
- Digital platforms allow for enhanced interaction between broadcasters and listeners through features like social media integration, live chats, and audience participation in

polls or discussions, fostering a sense of community and boosting engagement. By using algorithms to suggest content based on preferences and viewing history, digital platforms offer a personalized listening experience tailored to individual interests. Traditional broadcasters are challenged to adapt to the digital landscape, necessitating investments in digital infrastructure, compelling content creation, and engagement across various digital channels to remain competitive.

- Shifting Analogue to Digital Mode the Spectrum efficiency of Radio Pakistan will be increased and multicast one same frequency would be possible.

2.3. Boom in the Digital Music Industry

Music lovers in Pakistan have grown tremendously. The United States will be leading the world in income generation for the music streaming business, with an estimated \$12,110.00 million in revenue in 2024, in comparison to other nations. The Music Streaming market in Pakistan is projected to reach a revenue of US\$20.79m in 2024. In a report issued by CAGR 2024-2027 (A compound annual growth rate formula that calculates the rate of return and investment to the growth of the business.), It is predicted that an annual growth rate of 5.91% (CAGR 2024-2027) will result in a market volume of US\$24.70m by 2027. Radio Pakistan, with its plan to shift analog to digital broadcasting, would be able to earn some revenue which at present is in a fragile condition. With more local musicians producing and releasing their music online, the Pakistani music streaming business and listening behaviors of youth in Pakistan have also changed. Khan. S (2024), a Music Producer in Radio Pakistan and vocalist from a well-known Music family, Sham Charsi, opined that for the past few years, the music industry has been active and flourishing. Mooroo, Khumariyaan, Sounds of Kolachi, and Sikander Ka Mandar are just a few of the bands and musicians that are currently performing live and releasing original music throughout Pakistan and beyond. Nevertheless, there was still this feeling of incompleteness. Digital Migration, the introduction of new gadgets, and the installation of more digital Studios within broadcasting Houses in Lahore, Karachi, Islamabad, Quetta, and Sind are in prime need. Pop and Local Culture with regard to production and listening has reached the schools and colleges of small villages in Pakistan (Khan. S, 2024).

2.4. The shift to digital broadcasting and its Effect on Listener's behavior

The breadth of online radio content means that more and more people are likely to listen to a wide variety of content on a regular basis. The findings suggest that radio's entry into this new medium provides interactivity, democratization, and asymmetry, broadening its reach and helping it retain its relevance as an influential medium (Laor, 2022).

2.4.1. Effect on listener's behavior

The digital revolution in the broadcasting industry, particularly in Pakistan, has changed the way people listen. Gone are the days of analog broadcasting, and in its place, digital media offers a wider variety of content, better audio quality, and more opportunities for engagement

2.4.2. Change in Viewing Habits

The suitability of digital platforms has transformed the way audiences consume content. Rather than follow the normal broadcast schedule, viewers will be able to access the content at their leisure and thus have a more fragmented viewing experience, which is less predictable of audience behavior.

2.4.3. Enhanced Options

The transition from analog platforms has made a broader range of content available to Pakistani viewers. With on-demand services and a wide range of channels available, audiences have more choices to meet their various preferences and tastes. Digital platforms have made a wider range of content available to Pakistani audiences. With the availability of on-demand services and a wide range of channels, audiences have more choices to satisfy their various tastes and preferences. Through the integration of social networking sites such as Live Chats and audience participation in polls or discussions, digital platforms facilitate an increasing level of interaction among broadcasters and listeners, which leads to a sense of community and enhances involvement. Traditional broadcasters face challenges in adapting to the digital landscape, requiring investments in digital infrastructure, compelling content creation, and engagement across various digital channels to stay competitive.

2.5. Benefits to Marginalize Rural Communities

Rural populations have historically been among the most disadvantaged and marginalized because of things like restricted access to services and amenities, a lack of infrastructure and development, etc. The marginalized urban groups are another. Radio is the most widely used, reasonably priced, and conveniently accessible information medium in an area where the majority of people live in rural areas. Lack of frequencies is no longer an excuse for marginalized rural areas, thanks to digital migration, which gives them a unique opportunity to access the airwaves. As a result, underprivileged groups can now freely access information in their tongue and produce original material (Appolus, 2022).

2.6. Digital Migration in Radio Pakistan

Radio Pakistan has decided to use the best streaming devices in the upcoming years due to the diversification of the newest technology and its application in various program formats. Radio transmission is now more accessible to everyone with a computer, thanks to webcasting. In 2010, Radio Pakistan began incorporating web-based technology into its programming. Garden Radio Apps are being used by Radio Pakistan's medium waves and F.M. broadcasts to enhance their reception and grow their audience globally. With the Federal Government's assent, "Digital Pakistan decided to migrate Radio Pakistan entirely to digital format and launched three programs, Phases 1 through 3," according to the vision (Sheikh et al., 2023). Karim (2024) discussed some key features of digital migration in Pakistan's media industry, which include:

- **Online Streaming Platforms:** A number of conventional media outlets, such as television channels and radio stations, have already set up platforms for broadcasting their content on the Internet. These platforms attract a wider audience than conventional broadcast regions.
- **Social Media Presence:** Pakistani media companies increasingly rely on social media platforms like Facebook, Twitter, or YouTube to disseminate their content and interact with audiences. Digital media is an important tool for reaching younger demographic groups and fostering community involvement.
- **Digital advertising:** Over the past fifteen years, since Netflix made over-the-top (OTT) video consumption mainstream, streaming has come to be associated with television. These days, we watch our favorite teams play, catch up on the daily News, and binge-watch reality T.V. on streaming services. Nearly 40% of T.V. viewing now occurs through streaming, and 93% of internet users may be reached through streaming T.V. (Karim, 2024). In view of the shift in audience attention from traditional to digital media, advertisers in Pakistan are allocating more and more of their budgets to digital advertising. This has led media companies to invest in digital advertising and explore new cost-effective streaming media platforms with global reach and interruption.
- **Content Creation for Digital Channels:** Production companies create web series, podcasts, and short-form videos, especially for digital channels. This enables them to take advantage of new developments in the consumption of digital material and adapt to the tastes of online consumers.

2.7. Federal Government Initiative

Caretaker Minister for Information and Broadcasting Murtaza Solangi declared a Number of noteworthy turning points for Radio Pakistan's digital transition (Solangi. M, 2023). Radio Pakistan's move to DRM technology is a significant change among these. By installing DRM transmitters, Radio Pakistan will be able to extend its reach beyond Pakistan to neighboring nations and bring its broadcasts into compliance with international standards.

Karim: Programme Manager, Head FM 94, Radio Pakistan, Lahore Personal communicating Radio Pakistan is in the process of upgrading its musical library and all its historical material (spoken word material (Classical Music) of 1940, Speeches of Quaid-e Azam Muhammad Ali Jinnah, and new productions). The central production Unit of Radio Pakistan is actively involved in this project. This is part of a larger initiative to update the public broadcaster and increase its reach among domestic and foreign viewers. According to Solangi, "the broadcasting landscape is evolving globally, including in Pakistan," and Radio Pakistan is dedicated to staying at the forefront of these developments (Khan. S, 2024).

2.8. Live Streaming of Radio Pakistan

Considering how crucial it is to use modern technology, On July 21, 2022, the official Radio Pakistan mobile app was released and upgraded, giving listeners instant access to a variety of radio shows from the Radio Pakistan network. There is an app for every gadget. It is a remarkable accomplishment that Radio Pakistan has developed an app that allows listeners to access live streaming of its channels despite the financial crisis. The app allows listeners to choose from a variety of programs, including news updates broadcast in the world and external services. Live streaming and social media services are also available to almost all FM AND AM channels (Nadeem, 2024). So Far, Radio Pakistan has used the following transmission-wise broadcasting on its network.

- Home Service: Both AM AND FM). Programs originated to fulfill the needs of local communities in all different regions through streaming.
- External Services: Short Waves/Medium Wave Network/F.M. via Radio Garden.
- The FM network is highly well-liked in the neighborhood, and stations FM-93.5, FM-101, FM-93, and FM-94 broadcast popular shows, including the Islamic program Saut ul Quran on Network

2.8.1. Radio Garden

Around forty thousand stations, preserving the order and quality of international choices, are available on garden digital radio. Around 8,000 registered stations, including all F.M. Network of Radio Pakistan, are available on Radio Garden with clear reception. Any FM radio anywhere in the world can join (Karim, 2024). The Netherlands Institute for Sound and Vision (supervised by Golo Föllmer of Martin Luther University of Halle-Wittenberg). This transcontinental Radio Knowledge Platform, which was initiated in 2013-2016, is a joint project of five European universities. The website's interface is a three-dimensional geolocation where users can explore a globe representation while listening to local radio station broadcasts. The "Live" webpage lets users explore the world in real-time while listening to what local radio stations are playing. The service claims that the service Radio Garden has reduced the world of radio into a Global radio village. This analog-to-digital transition is the best example of connecting the world community into one organic hole. The application is available on Google Play. The coverage area of Radio Pakistan's streaming service can vary depending on its online infrastructure and agreements with streaming platforms. Typically, it can be accessed worldwide as long as there is an internet connection" (Shahid. Saleem (Deputy Controller Engineering).

Digital Migration in African countries: The process of digital migration started soon after broadcasters in African countries realized that the existing analog Radio/T.V. broadcasting system was not a solution to reaching the entire population of the region. So, a switch-over from analog transmission to (DRM) digital radio Mondiale is a must. The Geneva 2006 agreement served as the impetus for the Nigerian Government's 2009 action on the white paper. It stressed that all participating countries must obligatorily transition all Ultra-High-Frequency (UHF) and Very-High-Frequency (VHF) terrestrial broadcasting from analog to digital transmission by June 17, 2015, and June 17, 2020 (Aihe, 2008 June 11). The transition from the analog broadcast era to the digital broadcast regime was heralded globally during this time. Nigeria could not afford to lose this chance, so the country's then-president, Alhaji Umaru Musa Yar'Adua, embraced the idea of switching from analog to digital broadcasting in Nigeria starting on June 17, 2012, in accordance with ITU resolutions (Omale, Ekhareafa, & Essien, 2018). At present, 40% of Africans are under the age of 15. Education on the continent must provide African children with the knowledge and skills they need to succeed in the youngest and fastest-growing continent in the world. This is where Digital Radio, or DRM, comes into play. DRM Chairman Ruxandra Obreja, in a piece that appears in the British newspaper *The Guardian*, raises the following problem: Africa is the youngest continent in the world, and achieving its full potential will require education. African State Broadcasters has taken a quantum leap in adopting Digital Terrestrial Network. Following figs indicates the implementation record of Digital migration status in Africa.

2.9. Status of Analogue Switch off in UHS

(*) == No ATT ever existed in the UHF band in these countries.

Digital Migration in the Middle East: As the world moves toward digitalization, the Middle East's broadcast sector has seen a substantial digital transformation. This is the switch from analog to digital broadcasting technologies, which offers more services including interactive

features, high-definition television, and mobile broadcasting along with better signal quality and more economical use of spectrum. To help with this shift, Middle Eastern nations have been implementing a number of digital broadcasting protocols, including DVB-T (Digital Video Broadcasting - Terrestrial) and DVB-S (Digital Video Broadcasting - Satellite). African countries have made remarkable progress in this regards and OTT Streaming Services: Over-the-top (OTT) streaming platforms are gaining popularity in the Middle East with quick pace. These platforms require high-speed networks, making 10G Ethernet cards essential for uninterrupted streaming experiences. Besides, remote production workflows allow for more cost-effective and flexible content creation. Middle Eastern countries such as Bahrain, Saudi Arabia, and the United Arab Emirates are investing in sports and eSports and hosting major events and tournaments (World Economic Forum, July 18, 2023).

Table 1

1. Algeria	1. Benin (2018)
2. Cote d'Ivoire (*)	2. Burkina Faso (2018)
3. Gambia (The) (*)	3. Burundi (2018)
4. Guinee-Bissau (*)	4. Congo Brazzaville (2018)
5. Kenya	5. DRC (2018)
6. Lesotho	6. Niger (2018)
7. Liberia	7. Senegal (2018)
8. Libya	8. Libya
9.. Malawi	9. Zambia (2018)
10. Mauritius	10. Cabo Verde (2019)
11. Rwanda	11. Ghana (2019)
12. Sudan (*)	12. Guinee (2019)
13. Swaziland	13. South Africa (2019)
14. Tanzania	14. South Sudan (2019)
15. Uganda	15. Madagascar (2020)

Source: African Telecommunications Union, Digital Migration Status (Update) in Africa

2.10. Digital Migration India

The pace of development in the digitizing public broadcasting sector in Pakistan is less cheering than in India. All India Radio is a lot ahead and has added more transmitters to its DRM (Digital Radio Mondiale) network. Besides, with the announcement of the debut and testing of new Digital Radio Mondiale transmissions, All India Radio is moving forward with its digital radio transformation. Panaji and Jammu by AIR During the first few weeks of November, AIR Panaji simultaneously aired their primary stations in digital and analog formats. Russia was able to hear the transmission from AIR Bangalore in the interim. AIR Mumbai has started testing in DRM mode at 1044 kHz, and the Asmita channel is open for simulcast on DRM mode at 568 kHz; AIR Jabalpur has stated that it is ready for digital radio transmission. In comparison, more stations are getting ready to start doing digital broadcasts as well. "South Asian countries and Europe appreciated this development and will rank India as a global leader in the development of digital radio, providing tangible proof of the benefits of DRM for all listeners, whether they live in urban or rural locations. India is using the DAB technology spectrum on Band 111 and L band, where the digital migration scheme allows transmission between allocated frequencies of 30 and 300 MHz for its state media, AIR, and Doordarshan. On January 31, a senior official of the concerned department met in a round table discussion in New Delhi with the members of the DRM Consortium for negotiation to broaden the transmission area. After that, All India Radio (AIR) successfully installed 35 DRM digital radio transmitters.

According to Prasar Bharati (Digital Radio Network of All India Radio), The Indian Minister of Information and Broadcasting commended Prasar Bharati and All India Radio for successfully finishing the DRM project's first phase in 2017. Along Pakistan's border, India has already constructed two 1,000 kW digital transmitters and several other capacity digital transmitters. Pakistan desperately needed this program to be competitive with its fiercest adversaries. AIR Transmission on DRM comprises News programs, Entertainment (Classical Music – Raagam), Sports – Live Cricket, and Education Programs. DRM service Over 2 million cars in India have line-fit DRM Receivers, and most Indian car Manufacturers are installing them (DRM, 2024).

2.11. Digital Migration in Southern Africa

Radio is the most widely used, reasonably priced, and conveniently available communication medium in an area where the majority of people live in rural areas. The non-availability of the airwaves spectrum is no longer an excuse for marginalized rural areas, thanks to digital migration, which gives them a unique opportunity to access the airwaves. As a result, underprivileged groups can now freely access information in their tongue and produce original material. The broadcast industry has embraced new technology, leading to the migration of most of Southern Africa to digital broadcasting. This has freed up more radio frequencies for use on the air. Alternative commercial and community radio stations have emerged as a result, allowing listeners to choose the content and get information in their native tongues.

3. Benefits of Paradigm shift from analog to digital

Cost-effective: Numerous factors necessitate the changeover. For example, compared to the new digital technology, analog is more expensive, has a smaller frequency spectrum, and is less efficient. However, digital technology is also more affordable. It provides an infinite number of frequencies in all broadcasting spectrums, making broadcasting frequencies accessible to a larger variety of individuals and interest groups. It opens up more frequencies for broadcasters and content producers to choose from, allowing new competitors to enter the market. By giving voice to the voiceless, it strengthens and expands access to human rights and knowledge. The ability to obtain information in a preferred language is arguably the biggest advantage of this digital shift. For marginalized communities, this breakthrough should ideally mark the beginning of a new era in which they choose their development objectives and have access to information in the languages of their choice. Well, with digital migration, people are now able to gain access to the airwaves/ broadcasting stations of their choice. The case of CGM (China Media Group) in International Broadcasting has expanded its international reach, broadcasting content to audiences worldwide. This improves China's soft power and inspiration on the global stage. CRI (China Radio International) is broadcasting its programme in more than 70 languages and successfully promoting cross-cultural understanding and cooperation.

Qualitative improvement: The broadcast industry's advances in technology have led directly to the digitalization of broadcast operations, and the advantages are enormous. The broadcast media sector has entered a new phase thanks to digitalization, which has erased the previous phase of analog-based operations that defined the sector. Notable advantages of this new era include crisper images and audio. In this regard, Karimsabbagh (2012) pointed out that the introduction of digital technology has resulted in both a qualitative improvement in the media's production and distribution tools as well as advantages for users, who are now active participants in the communication process.

Audio/Video Friendly Transmission: Analogue broadcasting has a limited spectrum, with poor dissemination of content, both audio and video, and high complaints of signal interference. Hi-tech development in the media sector has caused a big transformation from analog broadcasting to interference in digital terrestrial transmission, leading to improved transmission and providing low-cost care and better reception with negligible interference. In all this shift, the role of the International Telecommunication Union (ITU) is commendable. For more initiatives, a Regional Telecommunications Conference in 2026 became a must to be adopted by the developing countries (BAZ, 2012).

Simulcast on single frequency: The quantity of programs that listeners and viewers are exposed to on a daily basis adds value to them globally. With the newest trend, broadcast stations can now use a single transmitter to transmit several programs simultaneously on a single frequency, something that was previously unfeasible with analog technology (BAZ, 2012).

Limitations: Radio Pakistan at present facing a severe financial crunch and it seems quite difficult for the new administration to complete the ongoing DRM projects. However Director General Radio Pakistan is optimistic the financial problems of Radio Pakistan address this issue through comprehensive planning (Sheikh. A.S, 2024).

The capital required to purchase digital equipment and associated installations is high, and the necessary funds are not easily accessible (Chioma, 2014). In a similar vein, Muduka (2014) pointed out that while there is a significant financial commitment needed to make the transition from analog to digital broadcasting, there are still concerns about the availability of

funding. In all of them, there is a difference in the quality of sound and sharper picture between government and private media stations—signals of digitalized broadcasting. In far-flung areas in Pakistan and other developing countries, local communities need to learn the legal ramifications of starting a radio station and how to do so. Another major challenge that local advocacy groups find is sourcing funds. Another area for improvement is a need for more experience in managing or producing content.

3.1. Research Question

1. What is the status of Analogue to DRM Shift of Transmission of Radio Pakistan?
2. What are the reasons of delaying DRM transmitters installation in various region of Pakistan
3. How Radio Pakistan's management would address the financial crunch?

4. Methodology

Quantitative study approach was adopted. With help of extensive literature review. Personal communication with high ups of ministry of information and broadcasting and EPU (Equipment production Unit official of Radio Pakistan, interviews with Programmes producer and station heads of various PBC units were conducted. The status of ongoing projects of DRM and new initiatives, upgradation of studio, streaming media service and web casting of radio Pakistan were asked. Descriptive analysis was used to address this study's research questions. What is the status of Analogue to DRM Shift of Transmission of Radio Pakistan?

5. Findings

Ministry of information and broadcasting is eager to complete the undergoing DRM projects on time to inject a new life in the production and presentation of news and programmes and Air their world service to broader audience with clear quality. Radio Pakistan at present is facing one of the most financial set-back since its inception. To cope with this situation and complete the upgradation process Director Gene the concern management to explore different avenues for revenue generation. However, it's quite encouraging that new Director General Saeed Sheikh assured that he would be able to attract government support in new fiscal year.

6. Conclusion/ Discussion

- The following are possible advantages of digital migration if successfully implemented in Pakistan's media industry:
- Enhanced reach of media content news and entertainment programs, government policy, and initiatives would be able to reach a larger audience through digital platforms
- Cost-Effectiveness: Compared to traditional broadcast techniques, digital distribution can be more economical, saving money on printing and distribution.
- Advertiser's benefit: Digital platforms provide advertisers with the ability to precisely target audiences with customized messaging, resulting in more successful advertising campaigns.
- Diverse Content Formats: Digital migration enables the creation and distribution of many content formats, including videos, podcasts, and interactive multimedia,

It is late, but it is good that Pakistan has officially launched the installation project of a 1000-kilowatt Digital Radio Mondiale (DRM) digital transmitter at Radio Pakistan's HPT complex in Rawat, Rawalpindi. Digital Radio Mondiale technology would transform Radio Pakistan's broadcasting competencies, allowing it to meet modern needs as analog and shortwave technology has become obsolete in the coming years. Regretfully, Radio Pakistan needs to move more slowly to keep up with these demands and carry on with its programming on the digital network. Due to a number of factors, including its low priority in the eyes of Islamabad's successive governments and the need for a significant source of funding from its sources, Radio Pakistan has been experiencing financial difficulties for some time. This is because commercial interests are clearly more drawn to television channels, which have recently expanded rapidly throughout the nation. Due to financial difficulties and other issues, Radio Pakistan is rapidly losing the trust of its different programmers and, to put it mildly is losing well-known voices such as those of artists, singers, musicians, and broadcasters. The suitcase radio comprises a fully functional broadcasting unit that doubles as a production studio and can also be used as a production studio. Like the Pacific island of Fiji, Pakistan should also include the provision of these gadgets in rural areas so that people can listen to programs of their choice while working on

farms and other locations. After the installation of new transmitters, 24/7 community-based programs should be initiated. The slots should cover education, farm mechanization, agricultural developmental programs, business development (SMEs), legal aid, and government support programs for the community, such as training opportunities. With the Digital migration of media, Pakistan's Public sector broadcast media, Radio Pakistan, and Pakistan Television, would be able to grapple with upholding social responsibility. Balancing social progress with cultural sensitivities and combating misinformation cratered by external media sources. It is indeed a big challenge for the Pakistan Government how to set priority to complete the digital migration initiated as phase-1, 2, and 3 by upgrading and installing a 1000 KW DRM transmitter. For the Collaborative efforts support from integration donors) are needed.

By working with ABU and Commonwealth Broadcasting, Pakistan can create a responsible media landscape and foster an informed and engaged citizenry. The Ministry of Information and Broadcasting and the allied department are closely watching the benefits of the Digital Migration Revolution and exploring its long-term impact on media and society. Radio Pakistan and PTV need to make faster headway with regard to infrastructure upgrades, which include updating their transmission equipment and studio technology to be compatible with digital signals. The missing factor is that there needs to be a plan to educate and encourage the public to adopt digital format. The public is doing it on its own, using a smartphone and finding new apps for their gratification. The government has provided nine hundred million rupees to Pakistan Broadcasting Corporation for the smooth payment of salaries to its employees for the last quarter of current financial year and expaction are quite high that new administration of Radio Pakistan will be able get more fund for their engineering projects comprises installation of 1000 Kw DRM transmitter in near future. Overall, digital migration in the media industry in Pakistan can lead to greater accessibility, efficiency, and innovation, fostering growth and competitiveness in the evolving media landscape.

6.1. Abbreviation and Acronyms Used

- DRM: Digital Radio Mondiale
- AM: Amplitude Modulation
- FM: Frequency Modulation
- Spectrum Trading: Airwave Business (Buy and Selling of Air time)
- X-mission: Transmission.

6.2. Recommendations

1. Infrastructure Upgradation: Public Broadcasters in Pakistan should upgrade transmission equipment and studio technology to support digital signal
2. Content Digitization: To preserve valuable items (Speeches, Music, and historical events), PSB pays attention to converting archival material into digital formats for seamless integration
3. Audience Motivation: Encourage the audience to adopt digital receivers and platforms.
4. Training Programmes: Necessary arrangements should be made to train technical staff and producers to handle the new technology for studio- and field-oriented transmission.

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