



## Analysis of Radio Broadcast

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### ABSTRACT

Radio is a public media that conveys the content of its message in the form of information, entertainment, news, and education by audio. In broadcasting, the Radio should have a program that suits the tastes of listeners, has excellent programs, and broadcasters who have their own privileges in communicating with their listeners, as is the case with this Fuad FM radio with some of its program programs that adjust the tastes of its listeners, besides that it does not forget to make its flagship show programs. Therefore, the purpose of this study is to analyze radio broadcast programs in general. The motto used is a qualitative research method. The results obtained from this study show an in-depth analysis of the ins and outs of radio broadcasting, starting from the programs, strategies for creating programs, factors, and others. So, a broadcast program is everything that a broadcasting station displays in the form of sound, image, or sound and image or in the form of graphics, and characters, whether interactive or not, that can be received through a broadcast receiving device to meet the needs of its audience.

**Keywords:** Entertainment, Radio Broadcast, Public Media

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## INTRODUCTION

From the past until now, everyone needs the entertainment to comfort themselves when unwinding from working all day. The entertainment they use varies, ranging from watching television, listening to the news, reading newspapers, reading magazines, listening to music, listening to the Radio, and others. One of the most frequently used from the past and now is Radio (Gimenez, 2019).

People from the past really liked listening to the Radio because on the Radio they could get a lot of things. Delivering news, interviewing famous people, listening to ball

events, listening to music, and others. Listening to the Radio gives the listener a unique impression. Apparel is when those listeners gather together somewhere to listen to a ball event. There will be a sense of family and closeness between fellow listeners (Guo, 2018).

As explained above, Radio has many programs, such as football matches, music, and others. Creating a radio program for today is arguably difficult because there are many other tools/media that can replace the radio position. Call it TV, tv already includes all radio programs and also regrets pictures. So many people have switched from watching television to listening to the Radio. Therefore, there must be the latest innovations that can keep Radio alive and attractive to its listeners. Because a good radio is a radio whose existence can be accepted by the public, and the content of the broadcast is widely liked by the outside community in general and certain listeners who are targeted in particular (Säily, 2020).

As a social institution, the national press must provide public services to the public in the form of news that concerns the lives of the people. The press is also obliged to give citizens the opportunity to express themselves. This function of the press has been able to implement Radio. This is because the interactive and content-laden character of Radio is locally contented, making it a public space for citizens (Fuentes, 2018).

Therefore, this article was created to provide an analysis of Radio, from the understanding and explanation of Radio and everything related to it to strategies that can be used to create radio programs. With this article, it is hoped that someone will study Radio further and reference this article to create radio programs that are interesting and acceptable to the public.

## **RESEARCH METHODOLOGY**

This research used the qualitative research method. Qualitative research methods are research methods that produce discoveries that cannot be achieved through qualitative research methods that produce data in the form of actions, words, and some observable development or change (Groenland, 2019). The approach used is literature study and literature study by collecting all references about Radio and everything related to it, then the necessary data is sorted and then compiled until it becomes a sequential reference.

## **RESULT AND DISCUSSION**

The definition of Radio as a form of mass media that prioritizes the side of musicality in its programs is now widely developed into a wider scope (Avokh, 2018). This means that there is not only monotonous music on the Radio because various information needs can also be allocated to various radio show programs. Rahanatha explained the notion of Radio, which is a technology used for the transmission of signals by means of modulation and electromagnetic radiation (electromagnetic waves) (Ellen, 2019). Thus, what is meant by the term radio is not only the physical form but the physical form, and Radio activities are interconnected and inseparable from each other. Therefore, if the definition of Radio is separated one by one or in physical detail,

then what is meant by Radio is the whole of the transmitter, studio, and receiver aircraft at once.

#### **A. Radio Programs and Formats**

The term program on the Radio can be analogous to goods or services that are sold in other forms of business. According to John R. Bittner, programs or often referred to as the term: events are goods that people need so that they are willing to listen to them. In the world of hospitality, understanding the station format is at the heart of all programming performance (Crabtree, 2018). Each broadcast program production process refers to the choice of radio station formats that are increasingly specific (segmented) as the number of radios increases and the number of listeners increases. The more modern the Radio, the more specialized the format, the more comprehensive a radio is, and the more focused the position of the Program. The sharpening of broadcast programs is consequential to the sharpness of the station format (Borkotoky, 2019).

The station format is defined as the formulation of the entire broadcast activity within the framework of listener service (Ellen, 2020). The station format is embodied in the form of basic principles about what, for whom, and how a broadcast is broadcast on a radio station until a show is communicated to the listener. The scope of the study of the station format is very broad, not limited to programming alone but also marketing.

For a new radio, it is very important to determine the format before starting broadcast activities. The process of determining the format starts from determining the vision and mission to be achieved and understanding the intended listener through scientific research to find out what the needs are and how sociological-psychological behavior is. From this, it is determined what stations are relevant and their implementation on the territory of the Program and marketing.

There are several suggestions in Howard Gough through Planning Producing Presenting the Radio Program that can be used as a guide in broadcast planning, namely (Lemaire, 2019):

1. Placement: the right spot.
2. Timing/Time: the duration or time range within each Program that has already been scheduled. It is also closely related to the forms of inserts that must be tucked in.
3. Announcement/Broadcasting: the words that the announcer speaks as an opening/introduction, assembly, and closing.
4. Publicity: exposure of a program or other forms of promo info.

The definition of a program in the context of broadcasting is an event or presentation package containing the content of spoken and written words, static and moving images, songs and music, sound effects, and light, which aims to be presented or conveyed through electronic media (Radio and television) to the audience. Broadcast radio only contains the language of the words of the announcer/reporter/narrator/source, music and songs, and sound effects, which are arranged and packaged in such a way in the form of programs to attract interest to be heard, music cycles, advertising terms, radio promos and program promos, traffic reports, weather reports, reportage, and

others. The clock format distinguishes morning, afternoon to evening activities. The arrangement is adjusted to the predictions about the listener's lifestyle during these hours (Furner, 2021).

In a broad sense, the format could mean the arrangement of the radio program as a whole, which becomes a kind of identity marker packaged in the radio program. Let's review the matter of format in a broad sense—a format that becomes a kind of marker of radio identity. The problem is how to make the Program interesting and get listeners. This is a very important aspect of the concept of "radio programming" and is equivalent to the development of the format (Wang, 2019). For example, a successful commercial radio broadcasting station will attract and reach a specific group of listeners. From its programming concept, the efforts made must fulfill the wishes expected by its listeners.

### **B. Event Program**

To attract as many listeners as possible, radio stations must have their own uniqueness compared to other radio stations (Venkatesh, 2021a). This uniqueness is usually found in the programs of shows broadcast by radio stations. The purpose of the Program of a commercial radio broadcasting station is to broadcast or air something that can attract the attention of listeners. Then it can be sold to advertisers. It can be concluded that the main purpose of the Program is the listener, who will then bring in advertisements.

Radio is music. Radio makes music a cultural gift of today. Listeners can enjoy different musical offerings every day through the Radio. Music can be listened to all over the place. The strategy of using music in the competition of the broadcast radio industry is indeed interesting (Zuberogoitia, 2020). People can listen to the same song on different radio stations or even from a privately owned mp3 player. Hence the music format is the most common format used by commercial radio stations. In addition to music formats, other formats that we can consider in arranging events such as news formats, debates, interviews, listener letters, phone in, comments, sports, quizzes, Q&A, and vox pops

Michael C. Keith then compiled the characteristics of the three major broadcast formats that are popular in the world as follows (Chan-Olmsted, 2020):

1. Adult Contemporary. This format is intended for young people and adults with a very wide age range of 25-50 years. The music broadcast includes pop, soft rock, and ballads.
2. Contemporary Hit Radio (CHR) atau Top 40 Radio. This format is intended for young teenagers aged 12-20 years. The music broadcast is top 40/top 30, interspersed with some simple tips. CHR is a radio that plays current songs. Older albums do not play in this format.
3. All News/All Talks. This format has a target audience of young people and adults aged 25-50 years. The broadcast concept is in the form of talk shows and news. Economic and political discussions became the most widely broadcast themes.

### **C. Radio Broadcast Strategy**

Radio places its listeners as subjects and participants involved. To be able to attract sympathy and engagement from his audience. In order to smoothen the message

conveyed to listeners, personnel who are involved in Radio need sufficient knowledge and experience in broadcasting. So that everything that has been planned can be achieved properly, so all personnel who are involved in this broadcasting world must have adequate knowledge in connection with their duties.

This knowledge and experience is the main capital in determining the operations that will be taken to attract the listening audience.

The most important factor determining the success of a radio and television broadcasting station is a program or event. Therefore, an effort to achieve the target listener requires "programming" or an event stylist. The arrangement itself is a process of organizing the Program, including its scheduling, so that a station format is formed with the aim of creating an image of the Radio station itself.

Each broadcast program should refer to a specific choice of broadcast format as more and more broadcasting stations become more and. Program strategy in terms of strategic management aspects, broadcast programs consist of (Ahmadi, 2020):

### **1. Program Planning**

In the broadcasting industry, planning is the most important element because broadcasting has an influence and a strong and great impact. Therefore, it requires careful planning in using data and facts as completely as possible. Planning includes: production planning and procurement of broadcast materials arranged into a series of daily, weekly, and also monthly agendas, planning suggestions, and pre-facilities, and planning administrative issues (Manap, 2019).

Broadcast program managers must consider four things when planning broadcast programs related to product means program material that listeners like. Price means the costs that must be incurred to produce or buy a program, place means when the broadcast time of the event is right, and promotion means how to introduce and sell the event so that it gets advertisements and sponsorships (Gomez, 2018).

Planning is part of the standard operating procedures (SOPs) for broadcast production that every broadcaster must comply with. SOPs include (Chen, 2019):

1. Planning and planning the production of broadcast packages through group discussions by the creative team with other broadcast implementers. The results of the planning are in the form of proposals that contain the name of the event, target listeners, goals and target listeners, broadcast placement, source of material words, music, duration, production costs, promotions, and crews who will be involved in the production such as producers, presenters, operators, and scriptwriters.
2. Collecting, searching, and collecting music materials and data that will be needed, including contacting potential sources. The collecting results are in the form of adequate and ready-to-process broadcast materials for event production.
3. Writing. all the material obtained is then classified to be further written as a whole in sentences that are ready to be read or arranged in such a way that it is assembled with an opening-closing script or interlude script.
4. Vocal Recording is the Recording of the voice of the presenter who reads the script in the recording room.

5. Mixing and combining vocal presenter material with various types of supporting music and songs by operators or mixers with analog or digital technology devices to produce a broadcast-ready event package. This process is carried out by observing the packaging standards of each event.

On air, The airing of the show is as per its planned schedule. Especially for live broadcast productions, there is no need to record vocals first.

Evaluation, after broadcasting or broadcasting the event package, is carried out, a joint evaluation by the production team for further development (Diaz, 2019). Evaluation includes what the material weaknesses, technical, team coordination, and so on.

## **2. Program Production**

Creating a program or radio show is known as programming (Barber, 2019). A program starts with an idea or ideas. This idea was then realized into a program through the production process. Broadcasting radio stations need programs to fill their broadcast time. It was with this Program that broadcasting radio stations gained listeners. Radio programs are generally made by themselves without involving outside parties.

Producing the Program involves many people. The activity of producing radio programs is carried out by the program department. The department is headed by a Program Director (PD). Pd is the person most responsible for the overall Program, including the program strategy. PD has various important tasks, including (Klonowski, 2018):

1. Choose a program and set the broadcast schedule of the Program so that it fits the segmentation of the listener.
2. He is looking for new ideas for his Program of events so as not to be monotonous.
3. Looking at the industry market competition. Pd is also obliged to anticipate the loss of listeners who switch to other radios.
4. Manage the presentation of broadcast content, such as news and music choices.

Large-scale radio broadcasting stations have a larger number of management personnel. Meanwhile, smaller radio stations have less management power.

Within the program department, the task of producing programs is not only carried out by the PD. PD is usually assisted by several crews who have their own duties, including (Ellen, 2021):

1. Producer

Producers usually play a role in short-term productions. A producer must be responsible for the Program he is taking care of, prepares all the necessary materials for the broadcast, strives for the quality of the content of the show, and be able to communicate and cooperate with the team. Good cooperation in the team can affect the quality of the Program (Ibanez, 2020).

2. Music Director

Music directors have responsibility for matters related to music, namely determining music formats, preparing and supervising playlists, listening to and searching for new music, understanding music that is in accordance with the radio format, and paying attention to music rotations on a daily, weekly, and monthly basis.

3. Broadcaster

The announcer is in charge of delivering the broadcast material to the listener. An announcer is a person who will deal with the listener, so it is required to maintain the harmony of speech and speech to make it interesting and pleasant to hear. In order for the broadcast not to be monotonous, the broadcaster must have a large treasury of words, languages, and terms. The announcer must be able to maintain the mood so that it can create an atmosphere that is familiar, warm, and friendly to the listeners. Other conditions that must be mastered by broadcasters, according to Prayudha (Venkatesh, 2021b), include:

1. Has the adequate vocal quality
2. Able to carry out adlibbing and script reading well
3. Understand its radio format and the clock format
4. Deeply understand its radio segments
5. Show sympathy and empathy for his hearers
6. Able to produce fresh and creative ideas in broadcasts
7. Able to work together in a team.

4. Scriptwriter

Scriptwriters are in charge of writing broadcast scripts, advertisements, and event promos with a customized conversational language. The scriptwriter must master the aural text or spoken language and the grammar of the rules of radio scriptwriting. The position of the scriptwriter can be captured by producers and reporters.

5. Reporter

The reporter's task is related to the news. Reporter responsibilities include reporting, collecting, writing, and reporting local news stories. According to Errol, in addition to being able to write a reporter, he must also meet the qualifications of a radio reporter, including understanding and understanding various terms, theories, and journalism education (Zhou, 2020). A reporter is also required to maintain sound quality so that listeners are willing to listen to the news they report and be objective about the news they report.

6. News Director

The news director has responsibility for the news broadcast by the broadcasting radio station. His responsibilities include determining news policy, supervising news staff, and deciding and selecting topics covered and reported. In addition to news directors and reporters, radio stations that have a news format usually have a staff consisting of editors, broadcasters, writers, and assistants (Briskman, 2020).

7. Production Operator

Production operators work on sound and sound parts such as advertising, radio play, and self-produced event promos. The program department is responsible for the activities and production results of the Program. The production of the Program needs to pay attention to the

established rules. Programs that do not comply with applicable rules will result in the termination of the Program and may even have an impact on the survival of broadcasting radio stations.

It is not an easy task for the program department to produce a quality program that many people listen to. The duties of the program department division include (Shtanko, 2018):

1. The incorporation of the content and production of programs that are of interest to the intended listener. The content of the broadcast must match the listener's segmentation to be on target
2. Scheduling the Program to match the time the listener listens to the Program. In this task, the program division should be able to schedule its event program according to the intended segmentation. For example, the children's fairy tale program is scheduled every Sunday at 08.00 WIB.
3. Production of advertisements, announcements, and advertisements of public services. All advertising and other productions are the responsibility of the program department.
4. The production or incorporation of programs may meet government regulations. The Program may not violate the Broadcasting Code of Conduct and Broadcast Program Standards. For example, the Sexology program, which is consumed by adults, is broadcast at 23.00 WIB.

Writing for Radio is not the same as writing for television and print media because writing on the Radio is directed to ear consumption. Because it is not for the consumption of the eyes or to be read, the philosophy of writing on the Radio reads: "Write like what you want to talk about" or "Write like what you want to hear" (Jain, 2018). So script writing on the Radio does not use written language but rather with spoken language. Because the broadcast script is for one listening, the use of unnecessary and lengthy words should be avoided. Word selection should be simple and easy to understand. The use of imaginative words is indispensable, considering that Radio relies solely on sound.

## **CONCLUSION**

It can be concluded that the Program is everything that is displayed by a broadcasting station to meet the needs of its audience. Thus the Program has a very broad understanding. A program is anything that is displayed by a broadcasting station to meet the needs of its audience. Thus the Program has a very broad understanding.

So a broadcast program is anything that is displayed by a broadcasting station in the form of sound, image, or sound and image or in the form of graphics, or characters, whether interactive or not, which can be received through a broadcast receiver to meet the needs of the audience.

## **SUGGESTION**

Thus we can describe the material that is the subject of discussion in this paper. We are aware of many shortcomings and weaknesses in the preparation of this paper.

We ask for feedback from all of you that are constructive for the future. Hopefully, the paper that we present can be useful for all of us.

## REFERENCES

- Ahmadi, M. (2020). The cost of global broadcast in dynamic radio networks. *Theoretical Computer Science*, 806, 363–387. <https://doi.org/10.1016/j.tcs.2019.07.013>
- Avokh, A. (2018). Interference optimization for multicast and broadcast traffics in multi-radio multi-channel WMNs equipped with directional antennas. *AEU - International Journal of Electronics and Communications*, 83, 439–450. <https://doi.org/10.1016/j.aeue.2017.10.008>
- Barber, B. (2019). Propaganda and Combat Motivation: Radio Broadcasts and German Soldiers' Performance in World War II. *World Politics*, 71(3), 457–502. <https://doi.org/10.1017/S0043887118000345>
- Borkotoky, S. (2019). Fountain-Coded Broadcast Distribution in Multiple-Hop Packet Radio Networks. *IEEE/ACM Transactions on Networking*, 27(1), 29–41. <https://doi.org/10.1109/TNET.2018.2882303>
- Briskman, R. (2020). Interference into radio broadcast satellite uplinks. *Acta Astronautica*, 166, 413–416. <https://doi.org/10.1016/j.actaastro.2019.07.040>
- Chan-Olmsted, S. (2020). Substitutability and complementarity of broadcast radio and music streaming services: The millennial perspective. *Mobile Media and Communication*, 8(2), 209–228. <https://doi.org/10.1177/2050157919856647>
- Chen, H. (2019). Fast and resource competitive broadcast in multi-channel radio networks. In *Annual ACM Symposium on Parallelism in Algorithms and Architectures* (pp. 179–189). <https://doi.org/10.1145/3323165.3323186>
- Crabtree, C. (2018). Using Electromagnetic Signal Propagation Models for Radio and Television Broadcasts: An Introduction. *Political Analysis*, 26(3), 348–355. <https://doi.org/10.1017/pan.2018.8>
- Diaz, L. (2019). Cooperative spectrum sensing technique for identifying illegal FM broadcast radio stations using an energy detector and a peaks detector. In *2019 22nd Symposium on Image, Signal Processing and Artificial Vision, STSIVA 2019 - Conference Proceedings*. <https://doi.org/10.1109/STSIVA.2019.8730244>
- Ellen, F. (2019). Constant-length labeling schemes for deterministic radio broadcast. In *Annual ACM Symposium on Parallelism in Algorithms and Architectures* (pp. 171–178). <https://doi.org/10.1145/3323165.3323194>
- Ellen, F. (2020). Constant-Length Labelling Schemes for Faster Deterministic Radio Broadcast. In *Annual ACM Symposium on Parallelism in Algorithms and Architectures* (pp. 213–222). <https://doi.org/10.1145/3350755.3400238>
- Ellen, F. (2021). Constant-Length Labeling Schemes for Deterministic Radio Broadcast. In *ACM Transactions on Parallel Computing* (Vol. 8, Issue 3). <https://doi.org/10.1145/3470633>
- Fuentes, M. (2018). Non-Uniform Constellations for Broadcast and Multicast in 5G New Radio. In *IEEE International Symposium on Broadband Multimedia Systems and Broadcasting, BMSB* (Vol. 2018). <https://doi.org/10.1109/BMSB.2018.8436805>
- Furner, M. (2021). Knowledge discovery and visualisation framework using machine learning for music information retrieval from broadcast radio data. *Expert Systems with Applications*, 182. <https://doi.org/10.1016/j.eswa.2021.115236>
- Gimenez, J. J. (2019). 5G new radio for terrestrial broadcast: A forward-looking approach for NR-MBMS. *IEEE Transactions on Broadcasting*, 65(2), 356–368.

- <https://doi.org/10.1109/TBC.2019.2912117>
- Gomez, J. U. A. (2018). Broadcast Storm Mitigation of ESMs Using Spectrum Sharing in Cognitive Radio VANETs. In *Proceedings - 2018 International Conference on Mechatronics, Electronics and Automotive Engineering, ICMEAE 2018* (pp. 102–107). <https://doi.org/10.1109/ICMEAE.2018.00026>
- Groenland, E. (2019). Qualitative methodologies and data collection methods: Toward increased rigour in management research. In *Qualitative Methodologies and Data Collection Methods: Toward Increased Rigour In Management Research*. <https://doi.org/10.1142/11449>
- Guo, W. (2018). Roads to Multimedia Broadcast Multicast Services in 5G New Radio. In *IEEE International Symposium on Broadband Multimedia Systems and Broadcasting, BMSB* (Vol. 2018). <https://doi.org/10.1109/BMSB.2018.8436874>
- Ibanez, A. (2020). Single frequency networks for 5G broadcast: A software defined radio experiment. In *IEEE International Symposium on Broadband Multimedia Systems and Broadcasting, BMSB* (Vol. 2020). <https://doi.org/10.1109/BMSB49480.2020.9379420>
- Jain, A. (2018). Accurate time difference of arrival estimation for HF radio broadcast signals. *Microwave and Optical Technology Letters*, 60(6), 1406–1410. <https://doi.org/10.1002/mop.31178>
- Klonowski, M. (2018). Brief announcement: Broadcast in radio networks time vs. energy tradeoffs. In *Proceedings of the Annual ACM Symposium on Principles of Distributed Computing* (pp. 115–117). <https://doi.org/10.1145/3212734.3212786>
- Lemaire, Q. (2019). Temporal convolutional networks for speech and music detection in radio broadcast. In *Proceedings of the 20th International Society for Music Information Retrieval Conference, ISMIR 2019* (pp. 229–236). [https://api.elsevier.com/content/abstract/scopus\\_id/85087097259](https://api.elsevier.com/content/abstract/scopus_id/85087097259)
- Manap, J. (2019). The relevance of radio broadcasts towards z generation teenagers in Malaysia. *Jurnal Komunikasi: Malaysian Journal of Communication*, 35(2), 123–142. <https://doi.org/10.17576/JKMJC-2019-3502-08>
- Säily, M. (2020). 5G Radio Access Network Architecture for Terrestrial Broadcast Services. In *IEEE Transactions on Broadcasting* (Vol. 66, Issue 2, pp. 404–415). <https://doi.org/10.1109/TBC.2020.2985906>
- Shtanko, S. V. (2018). Restriction of unauthorized access in radio systems with broadcast data transmission. *Informatsionno-Upravliaiushchie Sistemy*, 2018(5), 57–65. <https://doi.org/10.31799/1684-8853-2018-5-57-65>
- Venkatesh, S. (2021a). Artificially synthesising data for audio classification and segmentation to improve speech and music detection in radio broadcast. In *ICASSP, IEEE International Conference on Acoustics, Speech and Signal Processing - Proceedings* (Vol. 2021, pp. 636–640). <https://doi.org/10.1109/ICASSP39728.2021.9413597>
- Venkatesh, S. (2021b). Investigating the effects of training set synthesis for audio segmentation of radio broadcast. *Electronics (Switzerland)*, 10(7). <https://doi.org/10.3390/electronics10070827>
- Wang, S. (2019). Constrained maximum weighted bipartite matching: a novel approach to radio broadcast scheduling. *Science China Information Sciences*, 62(7). <https://doi.org/10.1007/s11432-017-9324-0>
- Zhou, Y. (2020). A decomposition-based memetic algorithm using helper objectives for shortwave radio broadcast resource allocation problem in China. *Applied Soft Computing Journal*, 91. <https://doi.org/10.1016/j.asoc.2020.106251>
- Zuberogoitia, I. (2020). Testing Detectability of Radio-Tracked Tawny Owls Using

Playback Broadcast Surveys: Designing Evidence-Based Surveys. *Ardeola*, 67(2), 355–369. <https://doi.org/10.13157/arla.67.2.2020.ra8>

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